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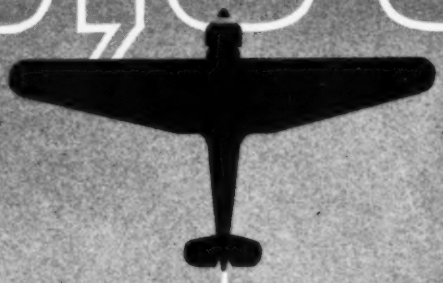

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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Principles

NOW that it has been decided by the Cabinet that the Admiralty is to have administrative as well as operational control of the Fleet Air Arm, the student of defence is inclined to look back and wonder how anything so irrational as the system now rightly brought to an end could ever have been tolerated in a nation which makes some claim to sanity. One may try to picture what the feelings of R.A.F. officers and men would have been if the Cabinet had insisted that every air gunner in an aeroplane must be supplied by the Army, and then one may form some idea of what the Navy felt when men of another Service were sent aboard their ships against their will. Of course, the officers and men themselves of both Services behaved as good shipmates, but that did not make the system right. So far as the personnel goes, the change is not very great. Only thirty per cent. of the pilots on the carriers were R.A.F. officers and will have to be replaced by naval officers and ratings. Incidentally, the Navy will now be free to use ratings as pilots, as it has wanted to do for a long time past, but the step has been forbidden by the Air Ministry. The R.A.F. fitters and riggers must be changed for naval artificers as the latter are gradually trained for the work. The temporary commissions in the Air Force hitherto held by the naval pilots will now disappear, which will very much simplify questions of promotion and command.

Problems

So far, everything about the change is not only easy but a simplification of a tangled knot. Of course, every administrative change must bring problems of its own; there must have been quite a crop of them in April, 1918, when the R.N.A.S. and the R.F.C. were amalgamated to form the R.A.F. The Cabinet is probably wise to let the two Ministries settle the details between themselves. It is to be hoped, however, that the Cabinet has laid down certain broad principles according to which the settlement must be made. The over-riding principle must be the defence of the country, not the saving of the face of one or the other Ministry. Economy is one factor which makes for sound defence, when it can be practised without loss of efficiency. Perhaps it would be better to say avoidance of waste, rather than economy, as the latter word has often been misused.

No Duplication!

It would obviously be wasteful from every point of view to duplicate the schools for elementary flying training. The proper handling of an aeroplane in the air is an art common to all pilots, and the Air Ministry is the authority fitted to impart it. If the Admiralty were to ask for its own flying training schools, such a demand must be promptly quashed by superior authority. Specialised naval flying, deck landings and so forth, may very properly be taught at special schools run by the Admiralty and paid for in the Naval Estimates. It is, of course, a matter of detail for the two Ministries to decide whether Gosport is to be handed over to the Admiralty; but somewhere there must be a school of advanced naval flying. At Lee-on-the-Solent there is the School of Naval Co-operation which is concerned with training naval officers to become air observers. As the observers have not held Air Force rank, it is hard to see why the R.A.F. should have been in charge of their training. Certainly that school must come under Admiralty control, and incidentally relieve the Air Estimates of its cost, but, again, it is a matter of detail for the two Ministries to settle whether that school shall continue to exist at Lee-on-the-Solent, or shall be moved elsewhere.

Flight has always maintained, and it repeats it, that it would be a very dangerous move to allow the Admiralty to place orders with the aircraft firms. The Air Ministry understands that business well, and it ought to remain the Ministry of Aircraft Supply. To interfere with that arrangement would be to ask for

the troubles which in 1918 made it necessary to abolish both the naval and the military air arms. If ever a suspicion should arise that the naval orders were not receiving fair play in the matter of precedence, that would be a case for Sir Thomas Inskip or his successor to prove that his office was no sinecure.

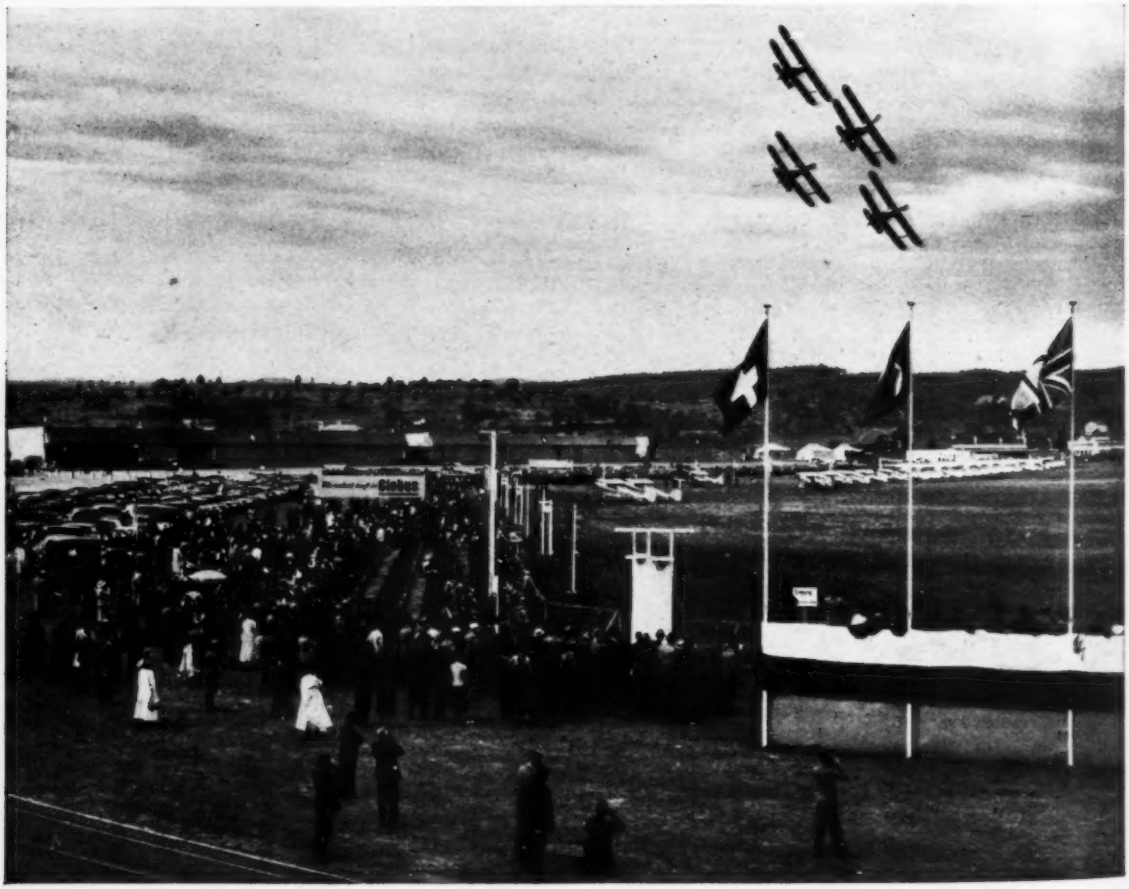
Future Needs

The most important aspect of the Cabinet's decision is that the dangerous practice of giving everything which flies to the Air Ministry, everything which floats to the Admiralty, and everything which fights on the ground to the War Office, has now been breached. A preliminary breach had been made when the R.A.F. raised its own armoured car units, to the horror of General Spears. We are now working towards the sound principle of making air defence, naval defence, and ground defence each self-contained. The next step must be to give the anti-aircraft units to the R.A.F. Lord Swinton the other day called this suggestion "futile." So it would have been if anybody had suggested that such a change could be made at the present moment. That would indeed be swapping horses in the middle of the stream. But it will have to come some day, when the time is ripe for it, because it is a sound principle, and because we are now openly working towards sanity and rationalisation of defence.

Paying the Piper

THERE can be few ratepayers who are not also taxpayers, and so the dispute between the Home Office and the local authorities as to whether the Central Government should or should not pay the whole cost of air raid precautions would seem to be mainly a matter of accounting. If the municipalities gain their point and force or persuade the Government to shoulder all the initial cost of the equipment and some fifty per cent. of the maintenance, the only people whose pockets will suffer will be dwellers in rural districts, who are not likely to be bombed. The boon of freedom from such an unpleasant experience ought to be enough for them, and they ought to be willing to help their countrymen who live more dangerously. In fact, protection of the civil population from the acts of the King's enemies is a national concern, whether that protection be afforded by fighter aeroplanes or by decontamination squads. No one has suggested that municipal rates should pay for a balloon barrage round any particular city.

Quite apart from questions of accounting, there is one very good reason why the Government should pay this particular piper. It will then be enabled to call the tune. Some municipal bodies need stimulation.



THE R.A.F. AT ZÜRICH. Four Furies of No. 1 Fighter Squadron give their R.A.F. Display demonstration over Dübendorf aerodrome.

The Outlook

A Running Commentary on Air Topics

The King's Cup

FROM the final list of entries for the King's Cup air race, to be flown on September 10 and 11 next, published on p. 167, it will be seen that 31 entries have been received. This compares with 28 entries for last year's race, so that the changes made in the regulations and courses do not appear to have brought about any marked improvement. There was a time when we could count something like 100 entries for the King's Cup race. That was a bit too much of a good thing, and imposed too great a strain on the organisers. But it is a far cry from 100 to 31, and this year's entry list cannot be regarded as satisfactory as to numbers, however excellent it is as to quality. This is all the more surprising as, in addition to this year's race being the first for a cup to be presented by H.M. King George VI, the prize money reaches the very gratifying aggregate of £2,000, thanks mainly to the generosity of Lord Wakefield of Hythe.

When the regulations were first published last April, *Flight* pointed out that this impressive total will benefit six competitors in addition to the actual winner of the race, and expressed the hope that private owners would feel that never was there a King's Cup race so well worth entering for. British private owners do not appear to share that view, more's the pity.

An analysis of the entries list brings to light the somewhat surprising fact that three manufacturers share 21 of the 31 machines entered, two more of one type being no longer built, and the remaining eight being all products of individual designers and constructors.

Capt. E. W. Percival heads the list with a total of nine machines, six being Vega Gulls and three Mew Gulls. Next comes Phillips and Powis with eight Miles machines, of which three are of the Whitney Straight type, and the others are single Falcon, Hawk, Magister, and Sparrowhawk types, plus one newcomer, known as the Hobby. What that is Miles alone knows at the moment! There is no telling what form a Miles Hobby will take.

The British Aircraft Manufacturing Co. will be represented by four machines, two Eagles and two Double Eagles. The Comper Swifts are, of course, out of production now.

Speeding-up

COMPARED with previous races, this year's King's Cup promises to include a greater percentage of fast machines. Probably the fastest will be found to be the De Havilland Comet which is to be piloted in the race by Mr. Clouston. This, as a point of interest, is the actual machine in which C. W. A. Scott and the late Tom Campbell Black won the England-Australia race in October, 1934. The speed is probably in the neighbourhood of 230 m.p.h. unless engine changes have since been made. The three Percival Mew Gulls are very much in the same class, and it is likely that these four machines will start very close together, assuming that all four manage to get into the Final. As the eliminating contest has been designed to weed out one-third of the entries, and the slowest third at that, there is every reason to expect to see these four fast machines in the Final.

How fast is the new tiny T.K.4 designed and built for the race by students of the De Havilland Technical School no one knows at the moment. This machine, an illustrated description of which appears in this issue, has not yet been fully tested, having but recently made its initial flight tests, but Sqn. Ldr. Clapp pleads guilty to "guessing" at 215 m.p.h.

From the fact that there are fast machines entered, it does not, of course, follow that the race will be won this year by a fast machine. The Final (but not the eliminating contest) is a handicap race, and, theoretically at least, the slower machines should stand just as good a chance, unless strong head winds are met on the day of the race. Nevertheless, the fact that several really fast aeroplanes are flying in the race always adds a great deal of interest and helps to bring spectators to the different controls along the course.

Getting Experience

THE long-range flying boats are quietly making history. Last week-end the British boat *Cambria* covered the distance from Botwood, Newfoundland, to Foynes, on the Shannon, in 12 hours, and a few days before the American Sikorsky *Clipper* had covered, for the first time, the distance during daylight hours. So far everything has gone smoothly, as one was entitled to expect it would during the relatively fine summer weather.

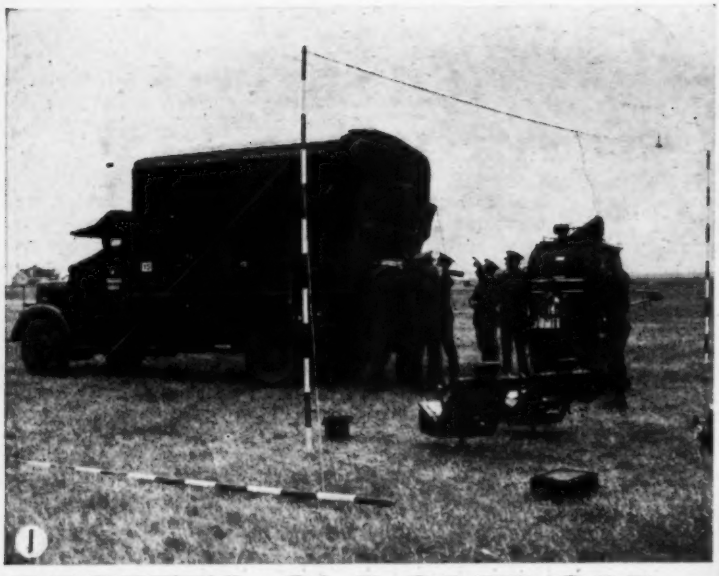
While rejoicing that the earlier flights should prove so relatively easy, it is well to remember that much still remains to be done before we have the experience necessary to ensure all-year *regular* commercial operation. The great advantage of the present experimental flights is that they enable the ground and air crews to become accustomed to working together during the most favourable conditions.

Flying Boats' Range

WITH *Caledonia*, *Cambria*, and the American *Clipper* making regular non-stop crossings of the Atlantic, apparently with the utmost ease, one hears with more than passing interest of the cruise of four London flying boats of No. 204 (F.B.) Squadron from Plymouth to Gibraltar and Malta. It is not long since it was a bit of a feat for a flying boat of the R.A.F. to make a non-stop flight between Plymouth and Gibraltar, but fortunately that time has passed. The Saro London is a very fine long-distance machine and, which is a very important point, it is roomy and comfortable inside, but naturally it has to carry full military load, excepting bombs, when on a cruise, and is not a mere flying petrol-tank. Comparison between the R.A.F. machines on duty and the experimental Short Atlantic boats would lead nowhere.

It is, however, well known that Air Ministry policy is never satisfied with present performances, but is always looking ahead and providing for something better. The designing firms are equally wide awake, and usually the drawings for a new type are on the board before the previous one has gone into production. Presumably it will never be necessary for the R.A.F. to possess a boat equipped to fly the Atlantic, but boats which can cover the distance between any two neighbouring refuelling bases in the British Empire when carrying full military load and perhaps bombs as well at a speed greatly in excess of present standards are an ideal which will surely be reached in the near future.

DIARY OF FORTHCOMING EVENTS—PAGE 161



LIGHTS O' LONDON

In Camp with the 28th (Essex) Anti-aircraft Battalion, R.E. (T.A.) : The Work of Our A.A. Ground Defences

Illustrated with "Flight" Photographs

SINCE *Flight* visited a searchlight detachment at the Duke of York's H.Q. two years ago a very noticeable all-round improvement has been achieved. Re-equipment is proceeding to schedule, and recruits are coming in as quickly as training quarters can be found or built. Many more men are wanted, but the authorities are not taking them on until places are available for setting them to work. In short, all is not yet well with our ground defences, but we can say that things are much better and should improve rapidly from now onwards.

Recently we were privileged to spend the night in camp with the 28th (Essex) A.A. Bn. R.E. (T.A.), by invitation of Lt. Col. A. G. R. Coward, R.E. (T.A.), and had the opportunity of visiting some of the detachments during their night exercises.

The 28th Battalion forms part of the 29th (East Anglian) A.A. Group, T.A., which is one of the Groups which co-operate under the orders of the A.O.C., No. 11 Fighter Group, whose H.Q. are at Uxbridge. In time of trouble they would probably have the vital sector immediately north of the Thames to look after.

For their annual training they had been posted to Manston Camp, Thanet, which adjoins the R.A.F. aerodrome. A searchlight battalion is sub-divided into four companies, and each company again divided into 24 detachments, which comprise a searchlight, sound locator, Lewis gun and power plant, in charge of one N.C.O. in command and eight other ranks. There is a plane table at the headquarters of each section of six lights. These detachments are, as far as is practicable, placed round the countryside at intervals of two miles. Obviously, it is not feasible to reduce this positioning to pin-point accuracy—one or two lights might fall in untenable positions, such as a river or on a railway line—so an allowance of 500 yards is given. This does not detract from the accuracy of results, but it does complicate to some extent the mathematics for obtaining these results.

For training, the Essex battalion had thirty-six lights in position and a further five in camp for training recruits. As targets, four civil aeroplanes (of which we shall have more to say later) fly on predetermined courses, as would enemy bombers, while a fifth machine, representing one of our fighters, flies over the area to get the searchlight detachment used to distinguishing between friend and foe. It makes the work of the listeners more difficult, as it masks the sound of the enemy aircraft from time to time. The system of spotting, height-finding, course and speed plotting is very simple. Briefly, it is this: The target having been picked up by the sound locators, the searchlights within range are turned on to it. Assumed figures of speed, position and height are 'phoned through to the operations room. As soon, however, as an aircraft passes immediately over a searchlight this is made known automatically to the other detachments, where the operators at the plane tables can assess the exact height and position almost simultaneously with the hearing of the signal. The third leg of the triangle has become known.

In the operations room a large map of the area

is laid out, and from the continuous information coming in over the telephones, the tracks of the aircraft are plotted, the height at which they are flying being shown as well. The accuracy with which this is done is almost uncanny, and pilots who have flown the target aircraft have been surprised when even very small deviations from their proper course have been pointed out to them.

There are, of course, some differences of technique according to the job in hand. If, for instance, illumination is being given for the benefit of defensive fighter aircraft, only three lights should be on a single target, the first light dousing as soon as the fourth beam is in position—the target being passed on from light to light, so to speak. For guns, however, there cannot be too much light, and every available light which can be brought to bear is trained on the target.

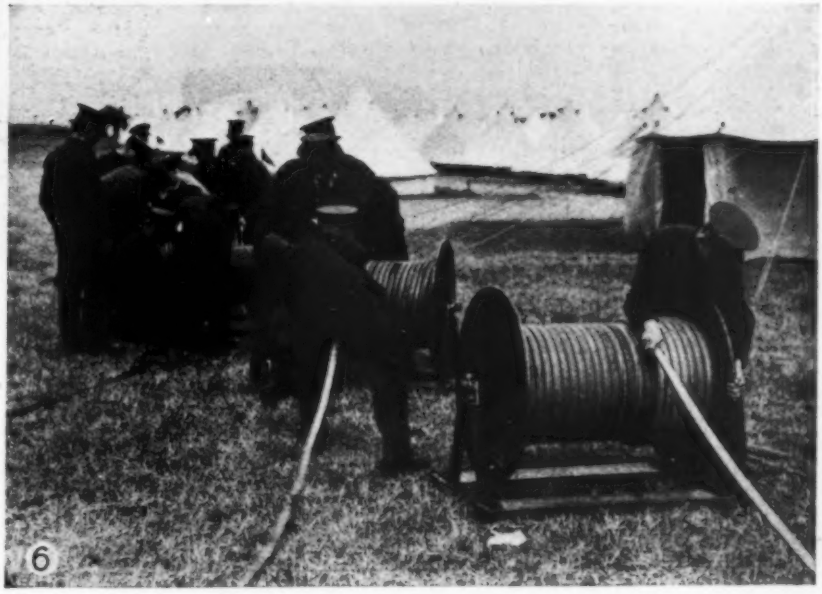
It would appear from the foregoing that searchlight operation is child's play. Actually, that is far from being the case. Continual practice by men really keen on their job is necessary to attain a high state of proficiency.

Now a word or two as to the personnel side of affairs. All the defence searchlights, as is well known, are manned by Territorial R.E. Battalions, but a battalion is not the closely knit company of men usually associated with the name, as they are spread about the countryside in detach-

(4) The Operations Room. Sappers with headphones laying out tracks of aircraft from messages received from detachments.

(5) Target South West. One of the new 90 c.m. high current density searchlights in operation. The Sapper in the foreground is reaching for the telephone.

(6) The cablegram. Spooling heavy electric cable at the end of the annual training.



(1) Setting up a searchlight position. The "dentists' chairs" in the foreground are for observers.

(2) Not in the telephone directory. Operators at one of the field telephone exchanges.

(3) The Rookery. Recruits practising with their lights in camp.

On their beam ends. The new 90 c.m. searchlights have a dispersion of only 1.5 degree. Carbons for the arc are changed in less than one minute.

X-chasing. The plane table which calculates the third leg of the triangle.

ments; the battalion H.Q. is mainly administrative, arranging training programmes and issuing equipment. Some of the officers, even, see all their fellows only during the annual training camp.

The year commences with individual training in all subjects for the first three months, then the most suitable men are picked for specialised work until about the middle of May. From then onwards they are split into the various detachments which have aircraft flying for them on two evenings of every week. By the time the annual camp arrives everyone is at the peak of his training.

Obviously, since the main work of the annual camp must be done during the few hours of darkness of the summer nights, it is difficult to arrange a programme to meet everyone's convenience, but as much leisure time as possible is given to the troops. Flying targets are available on four nights of each week, and the following are typical "orders of the day" when night operations take place: Reveille, 08.00 hr.; breakfast, 09.00 hr.; working parade, 09.45 hr. to 12.45 hr.; with a break of 15 minutes at 10.45 hr. From then until 20.15 hr. the only work consists of eating a very good dinner, tea and supper. At 20.15 hr. is another

(*Continued on p.* 161.)

The sound locators used are still of the old pattern.

Below: Back to Blighty. Sappers in their khaki overalls dismantling searchlights prior to returning home.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

LEVA-NEVSKI, who in 1935 made the first abortive attempt to fly from Russia to America, may follow up Russia's recent successes and attempt a third flight to California.

A landplane version of the big four-engined Hamburger seaplane designed for transatlantic service is to be built. It will have four B.M.W. -132 engines.

Each of the Armstrong Whitworth Ensign type four-engined transports will cost £54,000. The first machine is nearing completion at the company's Hamble works.

The official test of the first of a batch of sixty-five Hawker Hartebeests being manufactured by the South African Union Defence Force have been successfully passed at Pretoria.

It is rumoured that the Dutch Air Force plans to purchase a number of Fokker T.VI heavy bombers developed from the Pegasus-engined T.Vs now under construction.

Southampton Borough Council has just accepted the offer of the Supermarine Aviation Works, made in 1932, to present to the town the Supermarine S.6 built for the 1929 Schneider contest in which F./O. (now Sqn. Ldr.) R. L. R. Atcherley achieved the fastest lap and set up a world's speed record over 100 km. of 331.75 m.p.h.

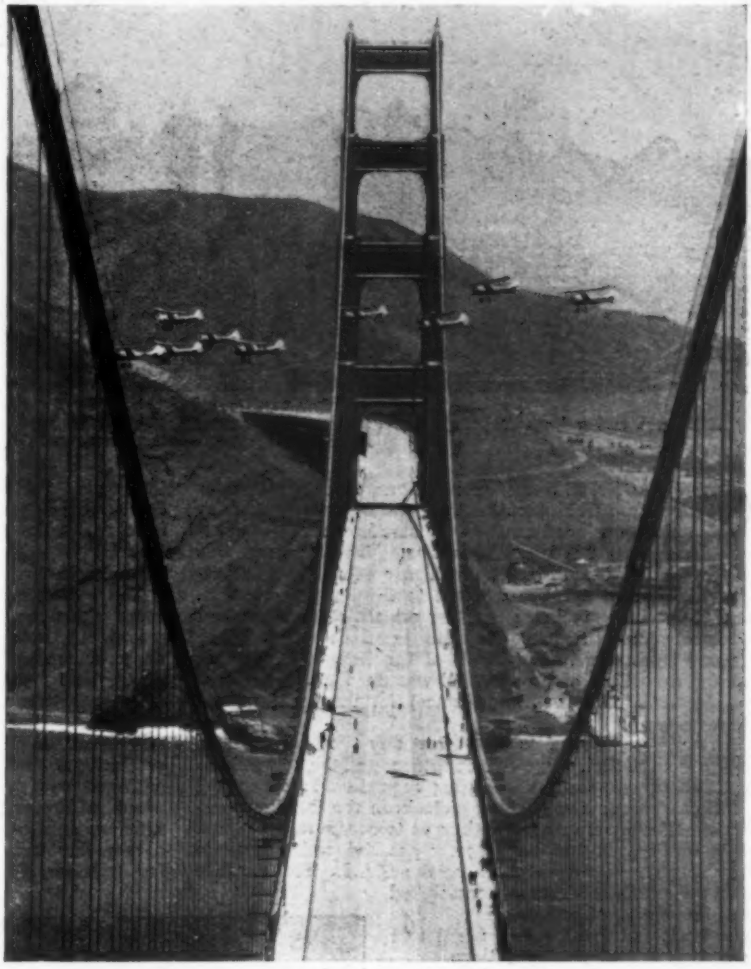
The Farman 2-230 four-engined landplane specially built for Air France-Transatlantique's experimental flights between Paris and New York, and one of the principal French entries in the race from Istres to Damascus and back to Paris, is the first of the big French machines entered for the race to be ready. The Amiot described last week may not start.

An Approved Type Certificate has been allotted the single-blade variable-pitch airscrew developed by the Everal Propeller Company, of Lancaster, Pennsylvania. Hundreds of orders are said to have been received. Advantages claimed are better take-off and climb, more miles per gallon, freedom from vibration and a reduction in gyroscopic action, resulting in longer life of airframe and engine.

Twenty-five Years Ago

(From "Flight," August 10, 1912.)

"We congratulate Mr. Cody upon the result of the arbitration proceedings before the Lords Commissioners of the Treasury whereby he has been awarded £5,000 as compensation in respect of his man-lifting kites which form part of the equipment of the British Army. It is also good hearing to know that Mr. Cody has given an undertaking not to communicate his invention to any foreign Government."



ACHIEVEMENT: An inspiring view of Vought Corsairs over the Golden Gate Bridge, San Francisco. This structure is claimed to be the world's longest suspension bridge and was opened to traffic a few weeks ago.

A Soviet parachutist, K. F. Kaitanoff, claims to have jumped at Leningrad from a height of 32,000 feet which, if confirmed would be a world's record.

The prototype Barkley-Grow monoplane, which resembles a Lockheed Electra but has a fixed undercarriage and a new form of wing construction, has been sold to Denmark. Its maximum speed with two Wasp Juniors is 225 m.p.h.

The new medium-supercharged Bristol Mercury XI (890 max. at 6,000 ft.) has satisfactorily completed a 200-hours' flight endurance test in a Hart with Bristol constant-speed airscrew. This combination gave a most impressive climb and the take-off usually occupied less than five seconds. Climbs were made to 28,000 ft.

Seversky claims to have completed tests with the world's fastest two-seater fighter which has been built for export. The machine has aroused great enthusiasm in China and Russia, and substantial contracts are likely to ensue. The tankage is sufficient for a range of 4,000 miles in overload condition.

Boeings have received an order for thirteen more YB-17 heavy bombers to augment the fleet of these machines already in service with the U.S. Army Air Corps. Four of the latest Wright Cyclone G engines, giving 1,100 h.p. for take-off, are specified. Except for minor alterations in equipment the machines will be similar to those already delivered. No news has been received of test flights with the still larger Boeing bomber which was designed for 1,500 h.p. engines.

THE PARIS RALLY

A Good Showing by Great Britain : Boundless French Hospitality

A Klemm and a Junkers Ju. 52 (the latter used to transport officials and mechanics), with Mr. W. Welton's B.A. Eagle behind, before the massive hangar at Orly.

CONTINGENTS from fifteen nations, totalling fifty-four aircraft, participated in the Paris International Rally which concluded at the Orly aerodrome on the afternoon of Sunday, August 1. The contest was organised by the former French Air Minister, Laurent-Eynac, as chief aviation delegate to the Paris Exposition, the object being to bring together private owners from all parts of Europe and to entertain them in Paris. The management was in the hands of the Contest Committee of the Aero Club of France, and was open to all members of Associations (excepting France) forming part of the F.A.I.

Pilots were allowed to take off at any time after sunrise on July 30 in their respective countries, and the competition entailed covering as much distance as possible before arrival at Orly between two and six o'clock on the Sunday afternoon. There were no restrictions as to course taken except that landings had to be properly checked and entered in log books by representatives of the F.A.I. The distance flown by each machine was multiplied by the number of passengers carried as the basis for making individual and national, or team, classifications.

In the national section of the contest the first prize of 50,000 francs and a 1937 Paris International Exposition Cup valued at 10,000 francs was awarded to the Royal Aero Club of Great Britain with 66,850 passenger/km. flown. Fourteen British machines contributed to the success, the highest individual figure recorded in this section of the event being that attained by Mr. Charles Gardner—43,580 passenger/km. The Aero Club of Portugal took second place, being awarded 20,000 francs and an Exposition cup valued at 4,000 francs. The Portuguese "team" was Mr. Ferrera Dos Santos, who contributed Portugal's sum total of 55,215 points. Germany, with ten machines, was placed third, taking 10,000 francs and a 4,000-franc cup with a score of 45,340 passenger/km.

The remainder of the field finished in the following order (the figures represent the number of passenger/km. recorded): Poland (32,311), Belgium (29,591), Czechoslovakia (16,766), Hungary (15,052), Greece (13,444), Switzerland (8,052), Lithuania (5,598), Luxemberg (4,472), Switzerland (4,004), Netherlands (2,746).

In the "individual" category Ferrera Dos Santos carried off the first prize of 40,000 francs for the Aero Club of Portugal. His total of 55,215 passenger/km. was achieved with a Caudron Goeland monoplane with two 220 h.p. Renault six-cylinder engines. M. Leon Challe acted as co-pilot, and the machine carried nine people for a three-day trip, starting from Buc aerodrome and touching at Rome, Berlin, Brussels, Nancy and Orly.

Commander Harold Perrin with the trophy he received in recognition of Britain's fine communal effort in the Paris Rally. It was presented by M. Laurent-Eynac who is seen next to Cdr. Perrin. On the extreme left is Ferrera Dos Santos who made the finest individual effort.

Charles Gardner (Royal Aero Club of Great Britain) brought his American Beechcraft (420 h.p. Wright Whirlwind) into second place. He carried four passengers—Mrs. Gardner, Miss Sanders, Mr. Peter Mursell and Mr. Delford. Mr. Gardner took off from Heston, flew to Nürnberg, thence to Gravesend, and then, crossing the Channel again, touched at several German centres, finally reaching Orly by way of Basle and Le Touquet.

Jules Titmar (Aero Club of Hungary) was awarded the third prize of 10,000 francs. He flew 15,062 passenger/km. in a four-seater Messerschmitt. The next six machines were awarded prizes ranging from 2,000 to 5,000 francs.

Competitors were regally entertained. Their programme for Monday was: 11 a.m., reception by M. Laurent-Eynac at the Palais de l'Air followed by an inspection of exhibits and a champagne lunch; 3 p.m., a garden party at the Chateau de Malmaison, former residence of Napoleon; 9 p.m., dinner given by M. Laurent-Eynac at the King George Restaurant in the Exhibition grounds. On Tuesday there was a reception at the French Aero Club and the official announcement of results, an excursion in launches on the Seine, and a visit to the Exposition, and finally a dinner given by Mlle. Deutsche de la Meurthe and Baron de la Grange at the Roland Garros clubhouse at Buc.

The remaining British classifications were:—

Place.	Owner or Pilot.	Aircraft.	Passenger/Km flown.
16	R. C. Preston	Percival Gull	4,286
20	Dr. W. L. Webb	D.H. Leopard Moth	3,794
29	Forsyth	Miles Falcon	2,619
31	Forsyth (Hill, pilot)	Miles Whitney Straight	1,746
32	R. L'Estrange Malone	Heston Phoenix	1,731
37	J. H. Lewis	Miles Hawk	1,584
39	Miss L. Dillon	B.A. Swallow	1,248
41	G. G. W. Farquharson	D.H. Puss Moth	1,154
43	R. Presland	D.H. Puss Moth	1,106
45	R. Malcolm	D.H. Leopard Moth	1,082
46	K. A. Wittone	D.H. Moth	1,030
51	Amsherst Villiers	Whitney Straight	778
53	Glenn Ogilvie	D.H. Gipsy Moth	566
54	W. Welton	B.A. Eagle	371

LIGHTS O' LONDON

(*Continued from p. 158*)

working parade, preparing for the night operations, which commence at 22.15 hr. Late refreshment is supplied at 01.15 hr., when the operations cease.

Everyone appears to be very happy; even the cows in the fields enjoy the occasion, and apparently think the sound locators are there specially for them to lean on. The officers entertain the farmers (at least, those who do not charge rent) in whose fields the lights are stationed, and "a good time is had by all."

One improvement might be made. Many feel that, if *only* for the annual camp, that modern high-speed military aircraft should be used as targets—as was advocated in a recent issue of *Flight*. Economy is given as the reason for the employment of civil aircraft; but when one considers the value that the training would give to the R.A.F. as well as to the Territorials, this excuse does not hold water. If hundreds of men are prepared to give up nearly all their spare evenings (and, in many cases, their annual holidays), a few pounds extra surely need not be taken into consideration. At present only a limited amount of experience with R.A.F. machines is obtained each year by A.A. units engaged in Sector training with the R.A.F.

This is not a recruiting article, but it must be said in conclusion that any man joining the "Lights" can be assured of an interesting time and good comradeship—the latter being one of the most desirable things in life.

Canadian Norsemen

CANADIAN AIRWAYS, LIMITED, have recently added to their fleet two Noorduyn Norseman 10-seater seaplanes with 550 h.p. Wasp H engines. Their first Norseman has been in use since last November. One of the new machines has been added to the equipment stationed at Prince Albert, Saskatchewan, and the other at Sioux Lookout, Ontario.

Further recent Norseman deliveries include one to Starratt Airways and Transportation, Limited, at Hudson, Ontario (this being their second), and another to Skylines Express, Limited. The latter is completely equipped for passenger service, and the cockpit divided from the cabin; it is used on a daily service from Montreal through the mining territory to Kirkland Lake and return, with intermediate stops at Sullivan and Noranda, a round trip distance of 740 miles. Both these machines are also fitted with 550 h.p. Wasp H engines.

Skylines Express is the tenth Canadian operating company to adopt the Norseman since deliveries commenced in the spring of 1936.

The Noorduyn Norseman is a high-wing braced monoplane designed to meet Canadian requirements.

"Flight" Index

THE index to the January-June, 1937, volume of *Flight* is now available and is obtainable at 7d., including postage, from Flight Publishing Co., Ltd., Dorset House, Stamford Street, London, S.E.1.

Binding cases are also available and are supplied, together with an index, at 4s. 4d., postage included.

New Dunlop Appointments

IT is announced that Mr. C. A. Proctor, overseas director of the Dunlop Rubber Co., Ltd., has been appointed managing director (commercial) and Mr. J. L. Collyer, director of manufacture, has been appointed director (manufacturing), in succession to Sir George Beharrell, who is the new chairman.

In the absence of one managing director the other will act for him.

Mr. Proctor has an intimate knowledge of the rubber industry in many parts of the world, having lived for long periods in Australia, France and Germany, and paid frequent visits to America, Canada and Japan in the course of his duties with the company.

Forthcoming Events

July 30-August 15. "Avia" Aero Exhibition, The Hague.
August 1-14. Yorkshire Gliding Club: Instructional Camp, Sutton Bank.
August 3-September 7. Public Schools Aviation Camp, Norwich.
August. 14. Eastbourne Flying Club: At Home.
August 14-22. Yorkshire Gliding Club: Open Contest, Sutton Bank.
August 20. L'Aero-Club de France: Marseilles—Damascus—Paris Race.
August 21. Midland Aero Club: At Home.
August 21. Royal Artillery Flying Club: Meeting, High Post, Salisbury.
August 21. Thanet Aero Club: Aviation Meeting and Race.
August 22-29. Italian Aero Club: Circuit of Littorio.
August 28 and 29. Cinque Ports Flying Club: Lympne International Rally and Wakefield Trophy Race.
August 28-September 25. B.G.A. National Soaring Competition, Great Hucklow.
September 4 and 5. Southend Flying Club: At Home.
September 10-11. R.Ae.C.: King's Cup Race.
September 12. Aero Club de France: Coupe Deutsche de la Meurthe, Etampes.
September 23. Aero Golfing Society: Ceilon Trophy.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

MAN-POWER FLIGHT

I AM very grateful to the Editor for opening up this subject and to the correspondents who have replied by letters to this journal or by letters to me direct. I feel, on summarising them all, that we are reasonably near to a solution.

Quibbling over small details will not get us anywhere, and further argument with the writer in "The Outlook" might resolve itself into a kind of political problem with "infinity" as the answer.

Let us, therefore, state briefly that in my article I showed that the b.h.p. of an ordinary person may be reckoned to be between 1¼ and 1½. In "The Outlook" you replied that Prof. A. V. Hill has stated that an athlete running uphill can probably exert about 1½ h.p., and you further referred to towing tests on a boat which showed that the average power output of man from rowing is only about ½ b.h.p. I am prepared to accept the first of these figures, as they are much the same as mine, but in view of my suggestions that the human motor develops its greatest power from bouncing effort I do not think that we are wise to consider tests on a boat being dragged through water. It is not akin to the lightness and springiness of an oscillating aeroplane wing, which is what the human engine has to manipulate in this problem. However, the answer is that somewhere in the figures provided, both in "The Outlook" and by myself, there is approximately 1½ b.h.p. available as a maximum and, in fact, this is generally agreed upon.

In the course of my discussion I frankly asked for the best results at present being obtained from modern gliders, and I proposed my ideal of a machine for man-power flight. I fully realised that it would be a feat of no mean order to produce a mechanical structure with the low weight, the shallow gliding angle and the slow speed that I asked for, and quite naturally I have received replies based upon existing glider practice which seek to show that such a machine is as yet not practicable.

THE IDEAL GLIDER

Mr. L. E. Baynes (Correspondence, *Flight*, July 29) provides some interesting figures of his sailplanes and seeks to show that flight by man power is not possible, as it will need from six to eight times the power that I have referred to, but he is basing his figures upon my ideal glider, and the point that I must make clear is that my proposed ideal glider was so "ideal" that it required *less than one-fifth of* 1 *b.h.p.* to convert its glide into horizontal flight. Both "The Outlook" writer and Mr. Baynes seem to have overlooked this point and the fact that the human motor is capable of developing eight times the power I aimed at using in my ideal.

Mr. L. E. Baynes quotes a machine weighing as much as 260 lb. *unloaded*, and seeks to prove that this will require 1.8 b.h.p. Therefore, the weight and type of this machine do not appear to be the best for this problem. Cut it down by 100 lb. and the combination of reduced weight and superior gliding angle makes the problem comparatively simple, or make the same machine a two-seater and we appear to have plenty of power to spare. The great point is that out of all the replies I have received there are no figures that prove my proposal to be impossible. In fact, they one and all prove that, by the means I am suggesting, man-power flight *is* possible.

Other figures that I have received show rather more promising results and make the solution even more probable. I have one letter from Yorkshire quoting a machine with a span of 42 ft. and approximate weight of 325 lb. *with pilot* and a total surface of 188 sq. ft. which has a flight speed of 12 m.p.h. It is by no means fragile and has been blown over five times without mishap. I have another successful machine quoted, the total weight of which is as low as 90 lb. Therefore, it would appear that somewhere between all these useful criticisms the machine that I am building has possibilities of flight by man power.

Mr. Baynes' query regarding a man pumping one pump with one hand, another with the other, and then others with his legs, and asking me if I expect to be able to add together the different powers, would not have been made had he carefully read my notes on the subject. These notes clearly pointed out the need for a mechanism that enabled the legs and the arms to be used to their best advantage by a suitable and predetermined combination, even to the extent of their being a number of degrees out of phase with one another.

The letter of Mr. H. C. van Odijck on the "Katzmayr Effect" is particularly interesting to the writer, especially where he refers to the flapping wing having the highest "Katzmayr Effect" at the wing tip and no effect in the middle of the wing. The small movement of the part of the wing near to the body and the extraordinary low aspect ratio at this part, even in fast birds, leads one to believe that this part of the wing, whilst approximating more closely to the fixed wing of the modern aeroplane, may be obtaining lift by reaction as suggested by me, and in this case I believe that the lower aspect ratio is advantageous. At the same time, we must not lose sight of the fact that it may be there to provide a parachute effect for slow landing. My opinion from observation is that the wing tips provide the forward propulsion and that they do this slowly and by flexion of the trailing edge in the manner of a fish's tail.

The figures that we have all discussed are, of course, assuming that we are using rigid wings as proposed by the Wright Brothers, and if experiments carried out by the writer and others are not entirely wrong it would appear that a plane surface moving relatively to the air through which it is travelling will produce lift to a far greater extent per b.h.p. than that produced by the conventional rigid wing, and this will be so much to the good.

FLAP VALVES

Many enthusiasts, including sailplane builders, have asked me the question as to whether the feathers in a bird's wing open out after the manner of a flap valve on the upward stroke so as to avoid downward reaction, and it might be well to clarify this point. There is, of course, no need for any such device, since the forward travel automatically provides the wing with lift. It is obvious, moreover, that a bird must restrain its wings from rising too rapidly, and it consequently obtains some lift *whilst the wings are actually rising* and this enables its body to fly on a straight path instead of on an undulating one (as does a seagull, for instance).

Some of the heavier game birds have to run rapidly along the ground before taking-off in order to provide forward velocity sufficient to avoid downward reaction from their rising wings, and it will be observed that nearly all these birds move their wings very rapidly.

Many aircraft engineers disregard bird flight as mere flesh and blood, but actually it is a highly scientific mechanism similar in its rudimentary principles to hundreds of mechanisms more recently designed by man. It is not the result of a theory or a mathematical investigation; it is the result of trial and error year by year for millions of years. The bird has perfect folding wings, instantaneous take-off, a retractable undercarriage, and it can fly vertically and can land vertically. Its gliding angle with its wings rigid as in our modern aeroplane is, however, of a low order—about one in six for the common rook, but this can be changed almost instantly to a one-in-six climb by what appears to be a mere flap or two of its wings.

WEIGHT REDUCTION

In conclusion, I naturally did not propose a glider so light and efficient as to maintain horizontal flight on one-fifth b.h.p. without having previously made some tests that might lead me to expect results approximating to the figures I gave. It is obvious that weight is the principal item, since the solution to my problem lies in minimum weight, minimum speed, and minimum gliding angle. These three are so closely related that the principal consideration is weight and the method of mechanical application, and I think that all will agree that we are only on the fringe of scientific weight reduction. I indicated a new spar or strut which I have developed, and I believe that by its use the weight of the structural parts of any modern glider can be reduced by more than 50 per cent. Therefore, in view of the fact that even with existing glider weights the figures that have emerged show that man has the power to convert a glide into horizontal flight with any well-designed sailplane, it would seem that there is no reason why I should not continue with my experiments.

London, W.1. GRANVILLE BRADSHAW.

Correspondence (contd.)

PILOTS AND RADIO OPERATORS

A RECENT article in *Flight* seems to have resurrected the question of the necessity or otherwise of specialist aircraft wireless operators. Firstly, whilst admitting a biased opinion, I agree with Mr. Brent; and think that the pilot-operator system would, to say the most of it, be worse than the present system, which is comparatively satisfactory only because the average standard of efficiency of the existing aircraft radio operators is considerably in advance of that required for the present provisional licence. This is so because, speaking generally, they have had a wide experience of radio, both operating and maintenance, before specialising as aircraft operators. This standard of efficiency is obviously lacking when the certificate is obtained without previous practical experience.

It is not difficult (bearing in mind what conditions are already like) to imagine the chaos that would result during the midday busy period if every aircraft in the Croydon-Continent area carried a wireless operator who was only up to, or round about the certificate standard. For a start, would they be able to read the Croydon weather reports at this time?

Mr. Crook draws a comparison with the number of subjects doctors have to study before qualifying, but he does not point out that the really successful people in the medical profession are *specialists*.

Perhaps, after all, there is something in the old "Jack of all trades" proverb. DUBIOUS.

Croydon.

NAVIGATION PROBLEMS

I WAS interested to learn from Mr. E. Brook Williams' letter (in the issue of July 15th) that the principle of proportional triangles is apparently taught in the marine navigation schools by means of trigonometry. I presume that the "schools where navigation is merely crammed into the student" (to quote Mr. Williams) are the air navigation schools which approach this and similar problems by the more obvious means of geometry.

Your note emphasising that such problems are merely of academic importance is welcome as this fact seems to have been overlooked by certain nautical instructors who have recently aspired to teach air navigation (probably due to lack of extensive air experience). Experienced air navigation instructors realise that practical air navigation along air traffic routes cannot include problems requiring such an amount of plotting. (The problem discussed by Mr. Williams involved the measurement of eleven lines and nine angles!) I think it is a fair statement to say that practically 100 per cent. of British Second Class Air Navigators fly as "pilot-navigators," and the mental picture of a pilot-navigator sitting at the controls of an air liner on a "bumpy" day, and at the same time trying to plot such a problem, is ludicrous.

Although I agree that the *fundamental* principles behind both air and marine navigation are mainly the same, I stress the point that the methods of application differ widely. There is an urgent necessity for air navigation to be freed from the mass of hidebound marine methods in which it is now entangled, and the method discussed by Mr. Williams bears out this point, for although "running fixes" may be satisfactory at sea, they are undesirable in the air.

London, W.11. C. W. MARTIN.

WEST-COAST WAVELENGTHS

I HAVE just returned from a fortnight's sea voyage on the West Coast of Scotland, during which I had occasion to visit five aerodromes, namely, Campbeltown, Monkton, West Freugh, Hall Caine and Ronaldsway.

I listened in regularly on the ship, and also at Campbeltown and Hall Caine, and I was struck by the unsuitability of the present wavelength for aircraft operating in the west. I presume there must be some reason for not having chosen a better, but I am sure that the present difficulties of communication between pilot (or wireless operator) and control would be considerably lessened if the wavelength was changed to somewhere in the region of 120-140 metres. On the present wavelength there is a great deal of interference both from lighthouse wireless beacons and shipping using Morse. The latter have an unhappy knack of butting in just as the pilot starts to speak! How often one hears the control telling the pilot he was jammed and asking him to repeat his message!

When I advocate the use of the wavelength suggested above, I realise that trawlers are apt to stray into that zone. Conversations between trawlers, however, are rarely important and still more rarely polite. Surely something could be done to put an end to all this unnecessary waste of space. Speaking times could be arranged for various trawler fleets, and strict control exercised for a while to prevent any deviation from the allotted wavelength. Then there would be plenty of space for aircraft, free from all interference, except atmospherics.

Another interesting point was the relative courtesy extended to passengers and visitors at Hall Caine and Ronaldsway. At the former, one meets with all the helpfulness and courtesy for which Northern and Scottish Airways are famed. This, of course, applies to all aerodromes staffed by their officials. At Ronaldsway, however, one feels that personal attention is lacking and that one is treated rather like a railway passenger. Also, the amount of profanity one hears is simply amazing. Whether this helps to maintain efficiency or keep the fog away I do not profess to know.

Edinburgh, 3. H. F. GLEN-WAKELIN.

[While certain changes may be made in due course, the aeronautical radio wavelengths are at present fixed and unalterable in the 800-900 metre band. Obviously it would be undesirable and dangerous for the different companies to have their own wavelengths, and all ground radio and D/F stations are, and are likely to continue to be, in charge of the Air Ministry. Centralisation and standardisation of radio and complementary services becomes more and more essential.

As far as "relative courtesy" is concerned it is almost inevitable that an airport, as it becomes busier, should lose that atmosphere of personal attention and tend to resemble a railway station—even to the conversational habits of the porters!—ED.]

PUSHER PURSUIT: Designed to attack anything in the air or on the ground this new American Bell monoplane has pusher airscrews driven by liquid-cooled Allison engines and is armed with a pair of cannons. It is a very brave effort for a new company and should provide a good deal of welcome data

ON the UP-AND-UP

Being an Account of the Experience of the Pilot of an Ultra-light, Made Possible by the Hustle of Air Ministry Officials

CAN you please tell me what the following letters and numerals mean? I think I know the letters, but I am not sure how to use the numerals: R.T.O.; A.I.D.; R.D.A.6; C.A.2.

The following short story might convey an intelligent interpretation of my understanding of them. Actually, the meaning to me is only a further proof of past experience, and I hope the forerunner of equally happy relations in Ariel House, such as they have been heretofore with Gwydyr House.

On Friday, July 30, at approximately 15.00 hours, I quite suddenly became aware of the fact that my office stool had become very wearisome. That, and the telephone, only had one more purpose to serve for me that day. I rang up Mr. Greenfield, of F. Hills and Sons, Manchester, and asked them if G-AEUP, their first production J.A.P.-engined Praga, was ready for me to collect. He informed me that R.T.O. had asked for further tests to be made at full load, to establish certain figures and data of conditions in flight at the full forward and aft C.G. positions. He further informed me that he was endeavouring to get these tests done at the earliest possible moment, and was confident that the result of the tests would be satisfactory.

I told him that I should catch the 6 o'clock "Lancastrian" from Euston to Manchester, and asked him to be kind enough to look me up at the Midland Hotel at 8 o'clock next morning, to show me over the works. I then explained the position to my friend, Mr. Boxall, of C.A.2, and left the rest to him, telling him of my proposals and asking him to do his best not to disappoint me in my desire to have a pleasant and carefree August week-end.

I duly arrived at Manchester, a little late, it is true, at 9.45 p.m. On arrival at the Midland Hotel I was handed a telegram from the Air Ministry, authorising me to fly G-AEUP from Manchester to Lympne and from Lympne to Ramsgate, and so I slept peacefully until breakfast arrived about 7 a.m. next morning.

Mr. Greenfield was there on time and I enjoyed a short tour of Hills and Sons' works, and admired some of the workmanship on the next four or five production Pragas. I was privileged to be shown further interesting proposed developments.

We then went out to Barton Airport and, after exchanging the time of day with Mr. Shoesmith and a most helpful and somewhat unduly pessimistic weather prophet in the control tower, I watched with interest five or six Pragas going about their lawful occasions at school work under the watchful eye of Mr. Shoesmith, what time the tanks of G-AEUP were being fully charged.

Consumptive

Round about 11 o'clock, having just said "how do" to Mr. Phillips, who appeared to be in a great hurry to get his high-speed 504K to Ireland, I swung the prop. into action and myself into the cockpit. I could almost feel my mount take the bit between the teeth and give a little buck of delight as the worthy "Smithy" slapped her behind and said "Gee-up."

We whipped off the ground and jogged round the paddock a turn or two, but the petrol gauge, being true to form, endeavoured to convince me that I had a leaking tank, which I knew I had not. It quickly registered the fact that I had spent four hours in the air, not a quarter of an hour, so we returned to check up on this. In less time than it takes almost to write, the petrol gauge had been replaced by an alleged more truthful species, and again we set off non-stop for Lympne.

My impression that the weather prophet at Barton had been pessimistic quickly changed, so instead of making the bee-line across the Pennines to which I had been looking forward, we changed direction half right and smelt our way along past Crewe, Stoke and Stafford. The combination of a forecast of wind speed 15 m.p.h. E.S.E. and a strong smell of good beer at 2,000 ft. convinced me that Burton-on-Trent was in the offing and, thinking of my worthy steed, I glanced again at the petrol gauge. This delightful adjunct of modern light aeroplanes assured me that there was very much less than 30 minutes' supply left in the tank. Pondering as to whether this particular liar was lying on purpose and tempting me to continue to Lympne, my thoughts turned to Leicester, John Masefield's "Renard the Fox," sandwiches and flasks, and straightaway decided that the Municipal Airport was a good pull-in for airmen round about the hour of 13.30.

Natural curiosity

I had a sandwich and half a can, but UP was very "taffety." She beat me, naturally enough, in the form of liquid refreshments, having done all the work, and very nearly consumed 4 quarts of Regent and left the dregs. She firmly refused to partake of even the smallest quantity of anything of a more solid nature. At 14.45 we said "Goodbye" to Flt.-Lt. Bateman, R.A.F.O., and his charming wife, and cantered along at a steady 70 A.S.I. reading, which seemed not to be far out as the milestones slipped by, and I thought of one W. L. Brock, my friend from U.S.A., whose humour was only surpassed by his gloomy countenance which he attributed to an antiquated high-speed (in appearance) Tin Lizzie which, he insisted, always gave him the impression that he was passing through a cemetery whenever he took it out on a run into the country from pre-war Hendon on one of his off-days.

Threading our way through kite barrages and wireless masts, past Epping, we browsed a while around several grassy open spaces. Closer inspection of one of these, and an enquiry from a very intelligent native, brought forth the following: "Reckon the land is like the price—bit too stiff." We seemed to recognise more familiar sooty scents being wafted up at us, and immediately changed up to full gallop for the open sea at Hythe. Turning into the then somewhat stronger N.E. wind, we sat still and had a breather for about 15 minutes, watching what appeared to be a lot of pretty butterflies racing round in circles. Finally, they seemed to get very much closer together, and one little white one seemed to me to wink an eye at the Porter of the Grand Hotel, Hythe, and therewith gave about a dozen others a faint whiff of some kind of benzole between there and the winning post. Having about 2,000 ft. to spare, and thinking there was safety in numbers, we dived down on the last straggling competitor and tried to pretend it was not downhill at all, finishing "also ran," record, native Praga mile 301/10th seconds.

A little more refreshment, most hospitably dispensed (proportions to Man and "Beauty" were much the same as before, quite accurately measured in both cases—4 pints to the rider and 4 gallons to the steed—and no solid food for either).

Therewith to Ramsgate Airport, where Capt. Maslin promptly handed me a large white envelope marked O.H.M.S. I thought of Mr. Boxall, then "What shall we do with a drunken sailor" (or was he a marine?). Yes, it was the log-book complete with C. of A. for G-AEUP. Handing "Beauty" over to Pente, I could not resist lending the stable lads a hand rubbing down and brushing up. I had the most amazing meal in the Airport buildings, but UP just had another nip and wouldn't touch her feed.

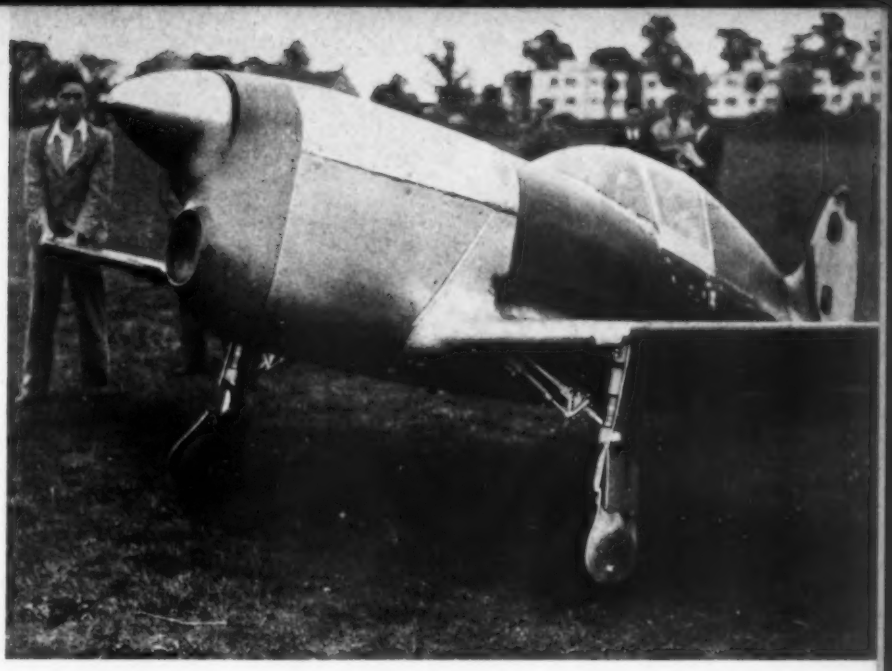
We both went to bed, one under tin and the other under canvas, and our last conscious thought was: "Please, God, bless A. M., especially R.T.O., A.I.D., R.D.A.6, C.A.2 by 6 divided by 2 take away the last C. of A., why doesn't the hurricane light go out. . . ."

POP-BOTTLE.

P.S.—Mind you, I have had a C. of A. a lot quicker than that, but it was too fast for the shutter.

BRITAIN'S SMALLEST

The Student-built T.K.4—A Slotted and Flapped Racing Machine



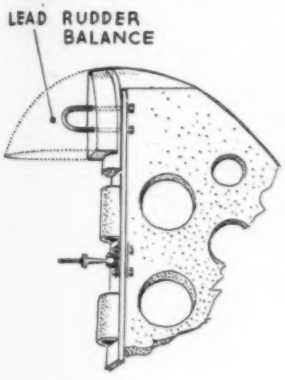
TO many ways of thinking the most intriguing light racing machine seen in this country since the days of the original D.H. Tiger Moth monoplane is the diminutive T.K.4 designed and built by students of the De Havilland Technical School at Hatfield. The machine is of interest not only on account of its unique features of design and construction, but because it is the smallest aeroplane ever built in Great Britain. A few of the home-made terrors conceived each year just before the American National Air Races may possibly have been tinier, but none has shown such practical originality as the T.K.4.

From the very beginning the machine, which should be flying as this issue goes to press, has been the students' "pigeon" entirely. Sqdn. Ldr. O. W. Clapp and Mr. E. W. Dodds have, of course, seen to it that the youthful technicians have not strayed from the straight and narrow path which leads to success in aircraft design, but everything from the 400 pages of stress calculations (which took six months to prepare, as the detail stressing is quite exceptionally thorough) to the final polishing of the surfaces has been the concern of the students.

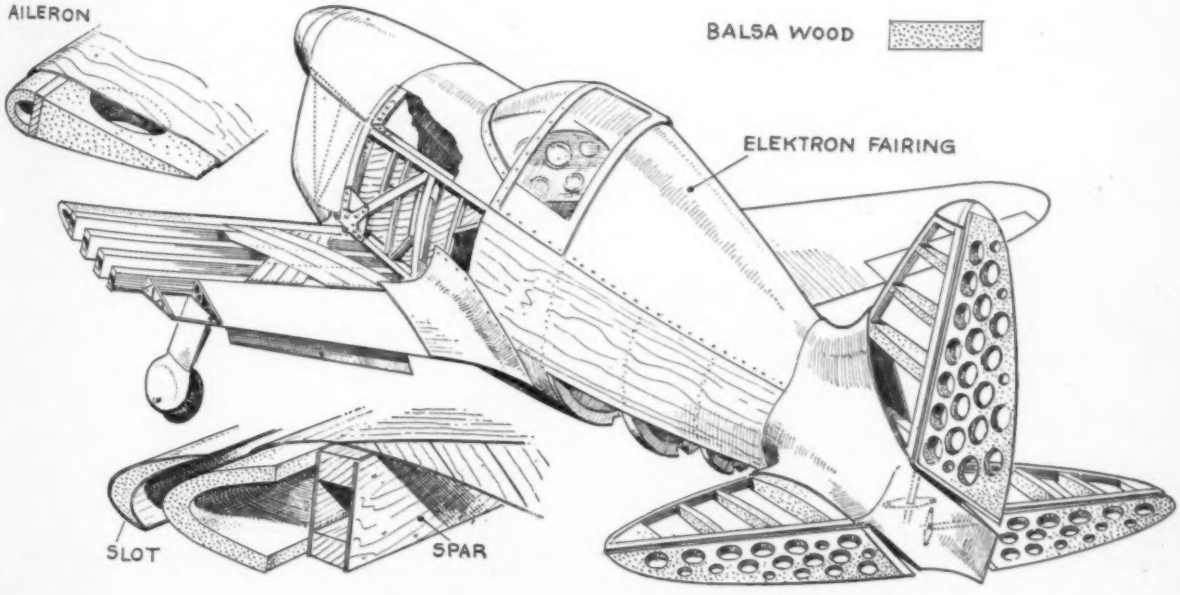
The T.K.4 has been entered for the King's Cup Race by Lord Wakefield, with "Bob" Waite as pilot. Sqdn. Ldr. Clapp is not prepared to disclose complete data, but has no objection to the statement that the machine's designed speed is 215 m.p.h.

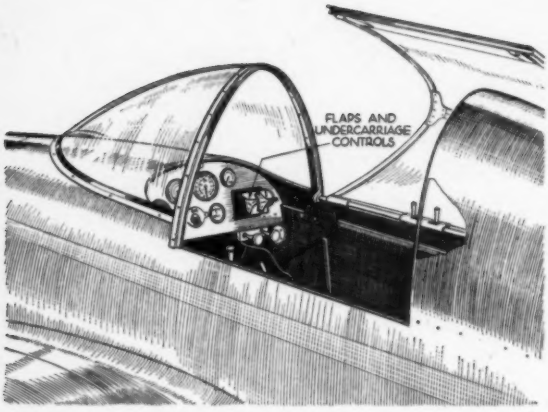
Other data are: Span, 19 ft. 8 in.; length, 15 ft. 6 in.; all-up weight, 1,180 lb.; full-throttle range, 450 miles; cruising range, 500 miles; absolute ceiling, 21,000ft.; landing speed, 62½ m.p.h.

Essentially the T.K.4 is a cantilever low-wing monoplane of wooden construction with Series II Gipsy Major engine, D.H. variable-pitch airscrew, Handley-Page slots,

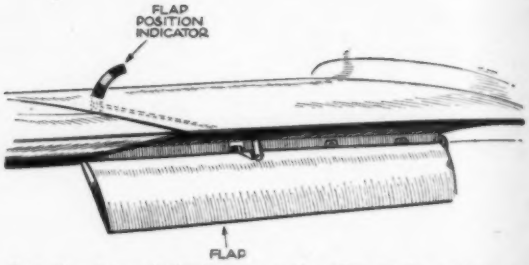


A special nose cowling has been developed for the T.K.4, and may be seen to advantage in the photograph in the heading. The duct, visible within the main intake, is for the carburettor air. Note also the diminutive wheels and undercarriage. The accompanying drawings reveal the extensive application of balsa wood in the structure of the T.K.4 and a number of other features of this unusual little aeroplane.





The cockpit enclosure of the T.K.4, seen above, will have a Sorbo pad on its roof panel to protect Mr. Waite's valuable head when the going is bumpy. The moulded Perspex windscreen is quite a masterpiece.

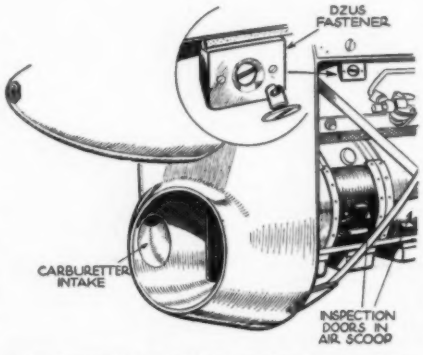


A quadrant-type indicator warns the pilot of the position of the trailing-edge flaps.

flaps and a retractable undercarriage.

The fuselage is deep in relation to its length. A semi-monocoque structure, it has four longerons, spruce formers, and is ply-covered throughout. It is continuous beneath the elektron fairing behind the cockpit.

The T.K.4 is the first machine (apart from an experimental Dragonfly) to mount the new Series II Gipsy Major engine, this being carried on a straightforward tubular mounting. This unit has been developed on similar lines to the Series II Gipsy Six and, in addition to being equipped for the operation of the "1,000" size D.H. variable-pitch airscrew, offers a higher continuous output than its predecessor, although the maximum power available is rather less than from the high-compression Major I installed in the T.K.2. In essentials the engine in the T.K.4 is a standard product, but incorporates a few modifications to suit it to the particular installation. For example, the nose cowl is of special design, the carburettor air intake and the inlet for the cooling air being combined in a scoop of circular section. Eventually the air intake may be moved farther forward to within half an inch of the airscrew so that additional boost may thus be obtained. As the air scoop is of modified design it is provided with small doors for the inspection of the sparking plugs. The cowling is quite flush, the usual hinges and draw wires having been abandoned in favour of American Dzus fasteners. A very handsome spinner fairs the airscrew hub.



The Series II Gipsy Major engine is essentially standard but has a special nose cowling, already mentioned, and there are inspection doors in the air chute permitting access to the plugs. The American Dzus fasteners are interesting.

Twenty-three gallons of fuel are carried in a fuselage tank forward of the cockpit, and there is a cylindrical locker (which will probably be used for the stowage of a collapsible lifebelt) behind the pilot's parachute seat.

The moulded Perspex windscreen is of fine aerodynamic form and must have presented quite a problem with its double curvature. A special quick-release device is incorporated in the coupé head which will have, in addition, a Sorbo pad to protect the pilot's cranium in bumpy conditions.

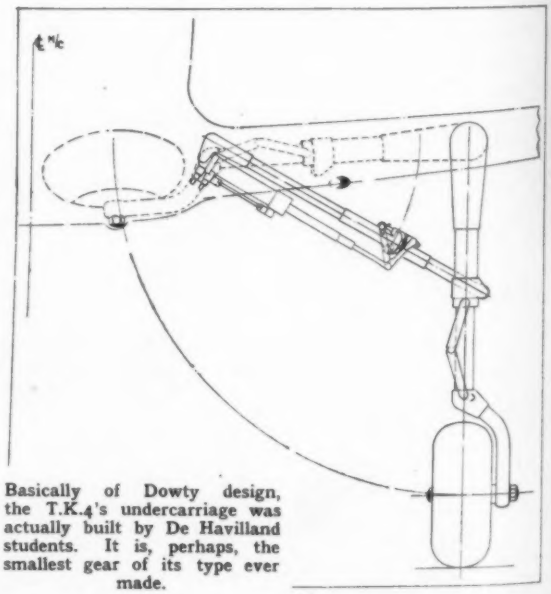
Teleflex controls are used throughout. Fore-and-aft control under various loading conditions is facilitated by a spring-loading device which gives an initial tension. The usual instruments are fitted. There is an ingenious locking device to ensure that flaps and undercarriage are not pumped down simultaneously, and in addition a push-pull lever is provided to lock the wheels in the raised position.

The wing has four spars and is covered on its upper surface with two laminations of spruce set at 45 degrees, the lower surface having ply covering. The section is symmetrical. Solid balsa wood is used for the tips, which extend inboard to the ailerons. The leading edge is of solid balsa. The tailplane is covered with ply which is supported on three balsa ribs, one inch wide.

A particularly interesting form of construction is used for the control surfaces, these being virtually sandwiches of solid balsa between outer layers of three-ply which take all loads. A balsa-ply combination is used extensively in the Albatross. Special tests were necessary in this connection as normal stressing methods were not applicable.

The H.P. slots are quite automatic and are possibly the smallest of their type ever made, measuring only about 3 ft. in length. They lie flush with the wing surface when closed.

The undercarriage retracts inwardly towards the fuselage and is probably the smallest of its type ever built. Two students were sent to the Dowty factory to pre-



Basically of Dowty design, the T.K.4's undercarriage was actually built by De Havilland students. It is, perhaps, the smallest gear of its type ever made.

Although the wing area of the T.K.4 is quite astoundingly small the landing speed should be kept within reasonable limits by the slots and flaps.

pare the detail drawings for this unit, the gear not being of standard type, and all the parts were made by the students at Hatfield, being sent to Dowty for assembly. Retraction is effected hydraulically. The bearing tube runs through the first three spars, there being a bearing in each. No brakes are fitted, but a spring tail skid is incorporated.

ZURICH ECHOES

A line-abreast formation of Italian fighters skating along at outrageous angles on their sides.

(Right) L'entente Cordiale: Col. Udet explains some of the finer points of the new B.F.W. Me. 109 monoplane fighter to a French visitor, M. Cambois. Standing alongside is Fräulein Liesel Bach, who put up a brilliant show in one of the aerobatics competitions.

With two Hispano-Suiza Series Y engines of 860 h.p. each, the Amiot 370, which has lately made its first flights, is estimated to be capable of 295 m.p.h.

FOR the DAMASCUS RACE

Bellanca, Couzinet and Amiot Monoplanes : Speeds Up to 295 m.p.h. Expected

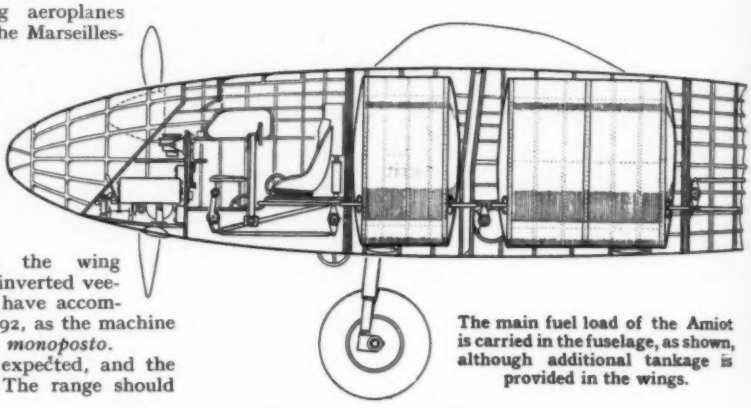
ALL being well, some interesting aeroplanes should line up for the start of the Marseilles-Damascus-Paris race on the 20th of this month. Some preliminary details of three of these are available, and the machines are depicted on this page.

The Bellanca, for Captain Alex. Papana, of the Rumanian Air Force (the photograph of a model is reproduced herewith by courtesy of *Shell Aviation News*), will be fitted with two Menasco C.68 Buccaneers in the wing nacelles and a geared Fairchild Ranger inverted vee-twelve in the nose. The cockpit will have accommodation for a crew of two, but the 28-92, as the machine is known, will most probably be flown *monoposto*.

A top speed of about 270 m.p.h. is expected, and the cruising speed should be 240 m.p.h. The range should exceed 4,000 miles.

The Couzinet effort, as will be gathered from the photograph, is a wooden monoplane with Comet-like wings and a pair of direct-drive radials. Judging from appearances, it should do an easy 250 m.p.h.

Fastest of the French hopes is the new Amiot 370, shown at the last Paris Salon with radial engines, but actually constructed as a prototype with two Series Y Hispanos.



The main fuel load of the Amiot is carried in the fuselage, as shown, although additional tankage is provided in the wings.

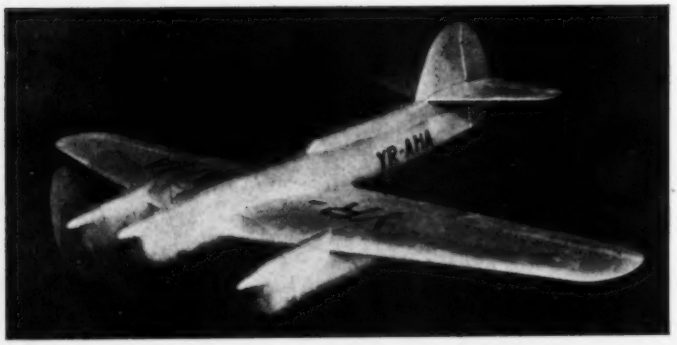
Of cylindrical section, the fuselage is probably as efficient aerodynamically as anything of its size ever built. From stem to stern it is perfectly smooth, there being no pilot's windscreen in the generally accepted sense of the term.

Tankage is provided in the wing for 2,800 litres of fuel, while the fuselage tanks, the location of which may be studied in the accompanying drawing, will hold 4,500 litres.

It is estimated that, cruising at 250 m.p.h., the 370 will have a range of 4,350 miles. The maximum speed should be 295 m.p.h. The ratio of gross to tare weight is exceptionally good, the figures being 22,100 lb. and 9,480 lb.

Dimensions are: span 65 ft. 7 in., length 45 ft. 10 in., and height 13 ft. 1 in.

The preliminary flights are said to have been very encouraging.



Captain Papana's Bellanca has a Fairchild Ranger inverted vee-twelve in the nose and two Menasco Buccaneers in wing nacelles.

The Couzinet monoplane has unusual accommodation for the pilot, and is powered by two direct-drive radials. It seems to be of wooden construction.

GOING THROUGH the MOTIONS

The Air Exercises : Practising Observers, Searchlights and Staffs : Over 400 Aircraft Engaged

THE Air Exercises held on Monday, Tuesday and Wednesday were not intended to prove whether London could be defended or not. They were designed to give all concerned much-needed practice in behaving as they would have to behave (so far as can be foreseen) in the real thing. In particular it was desired to exercise Nos. 4, 12, 15, 17 and 18 Groups of the Observer Corps, which had hitherto only been able to try their 'prentice hands on spotting single aircraft. Whole formations were new experiences to these very admirable men. The exercises were also intended to test the speed with which the Observers could get their reports through to the A.O.C., for on the speed of the communications depends very largely the chance of putting up an efficient defence.

Of equal importance was the desirability of giving practice to searchlight battalions of the Territorial Army Engineers. They cannot have too much practice, and often on previous exercises it has been apparent that they do not get enough—no fault of the keen Territorials, of course, but of the system. The T.A. units engaged were:

29th (Kent), 30th (Surrey), 31st (City of London Rifles), 32nd (7th City of London), 34th (The Queen's Own Royal West Kent), 35th (1st Surrey Rifles) Anti-Aircraft Battalions, R.E., and 1st Anti-Aircraft Divisional R.A.S.C., T.A.

The searchlights were located in the area Great Dunnow, Shoeburyness, North Bank of Thames to Purfleet.

The bombers were directed to route their raids so as to give the maximum of practice to the Observers and the searchlights. Accordingly, in the evening periods between 6 p.m. and 10 p.m. the light and medium bombers attacked from the west, and retired by similar routes. By night and in the early morning periods (i.e., from 4 a.m. to 9 a.m.) the raiders arrived from the east. The Observer Groups were only on duty from 6 to 10 p.m., though one group took on duty up to midnight on Tuesday night. Being volunteers, they had to earn their living by day.

In the R.A.F. there are many young pilots, officers and airmen who got much experience from these exercises. The staffs got practice in organising movements on a large scale, though the Air Officers Commanding got little chance to show their strategical and tactical ability. The bombers had to invite detection, though they were allowed to spring surprises by low flying and dive bombing.

Defending Forces

The defending air forces consisted of the fighter squadrons of No. 11 (Fighter) Group with two from No. 12 (Fighter) Group. They were under the supreme command of Air Vice-Marshal E. L. Gossage, C.B., C.V.O., D.S.O., M.C. Nineteen Fighter Squadrons were employed with a total strength of 222 aircraft, namely:

No. 1 (Fighter) Sqdn., Fury, at Tangmere; No. 3 (Fighter) Sqdn., Gladiator, at Kenley; No. 17 (Fighter) Sqdn., Gauntlet, at Kenley; No. 19 (Fighter) Sqdn., Gauntlet, at Duxford; No. 23 (Fighter) Sqdn., Demon, at Northolt; No. 25 (Fighter) Sqdn., Fury II, at Biggin Hill; No. 32 (Fighter) Sqdn., Gauntlet, at Biggin Hill; No. 43 (Fighter) Sqdn., Fury, at Tangmere; No. 46 (Fighter) Sqdn., Gauntlet, at Kenley; No. 54 (Fighter) Sqdn. Gladiator, at Hornchurch; No. 56 (Fighter) Sqdn., Gauntlet, at North Weald; No. 64 (Fighter) Sqdn., Demon, at North Weald; No. 65 (Fighter) Sqdn., Gladiator, at Hornchurch; No. 66 (Fighter) Sqdn., Gauntlet, at Duxford; No. 74 (Fighter) Sqdn., Gauntlet, at Hornchurch; No. 79 (Fighter) Sqdn., Gauntlet, at Biggin Hill; No. 80 (Fighter) Sqdn., Gladiator, at Duxford; No. 111 (Fighter) Sqdn., Gauntlet, at Northolt; No. 151 (Fighter) Sqdn., Gauntlet, at North Weald.

The Raiding Forces

The raiding forces consisted of light, medium and heavy bombers, with a total strength of 176 aircraft. The light and medium bomber squadrons were under the command of Air Commodore S. J. Goble, C.B.E., D.S.O., D.S.C. (R.A.A.F.), Air Officer commanding, No. 2 (Bomber) group, and the heavy bombers were commanded by Air

"Audax Omnia Perpeti." Gloster Gladiators of No. 54 (Fighter) Squadron take off from Hornchurch in fine style.

Vice-Marshal P. H. L. Playfair, C.B., C.V.O., M.C., Air Officer Commanding, No. 3 (Bomber) Group. The strength of the light and medium bomber units was 150 aircraft, and of the heavy bombers 26 aircraft, the total number of squadrons engaged being 18.

No. 12 (Bomber) Sqdn., Hind, at Andover; No. 21 (Bomber) Sqdn., Hind, at Lympne; No. 34 (Bomber) Sqdn., Hind, at Lympne; No. 35 (Bomber) Sqdn., Gordon, at Worthy Down; No. 49 (Bomber) Sqdn., Hind, at Worthy Down; No. 52 (Bomber) Sqdn., Hind, at Upwood; No. 63 (Bomber) Sqdn., Battle, at Upwood; No. 83 (Bomber) Sqdn., Hind, at Andover; No. 98 (Bomber) Sqdn., Hind, at Hucknall; No. 104 (Bomber) Sqdn., Hind, at Hucknall; No. 114 (Bomber) Sqdn., Blenheim, at Wyton; No. 139 (Bomber) Sqdn., Hind, at Wyton; No. 142 (Bomber) Sqdn., Hind, at Andover; No. 207 (Bomber) Sqdn., Gordon, at Worthy Down; No. 605 (Bomber) Sqdn., Hind, at Rochford, Southend-on-Sea, No. 9 (Bomber) Sqdn., Heyford, at Scampton; No. 38 (Bomber) Sqdn., Hendon, at Marham; No. 99 (Bomber) Sqdn., Heyford, at Mildenhall.

No attempt was made to assess casualties. By day the bombers photographed their targets, and by night there were cameræ obscuræ at Enfield, Walthamstow and Kidbrooke, which were the three targets selected for night attack. Nos. 65 and 151 Fighter Squadrons were the two units selected for night patrols.

In consideration of the feelings of the citizens of London no aircraft was allowed to fly below 5,000 feet when within seven miles of London Bridge. The safety rules and the rules of combat were the same as those laid down in previous years.

THE FIRST EVENING

ZERO hour (6 p.m. on Monday) approached, and two squadrons of Gauntlets and one flight of Fury II interceptors stood lined up on Biggin Hill aerodrome, while their pilots, mostly pilot officers and young sergeant pilots, hung round about, looking *more Brittanico* very unconcerned. Far overhead hung layers of light clouds, offering very little chance of concealment to raiding bombers; and these presently cleared away.

On a fighter aerodrome one does not hear "the cannon's opening roar." Its equivalent is a maroon, and at 6.31 p.m. the warning was blared forth. All waited anxiously to hear which squadron was to have the honour of first meeting the foe, and then suddenly one flight of No. 32 (F) Squadron was galvanised into furious activity. The Mercuries were started without let or hindrance, and a flight lieutenant and his men mounted agilely into their cockpits. No sound was heard by the onlooker but that of the engines, but actually an R/T message told the leader to climb high and look out for five enemy aircraft which were on the way to Biggin Hill.

Young Blood

This flight consisted of six Gauntlets arranged in two triangles which took off separately, but the whole worked as one fighting unit. It makes a very handy unit, and gives a chance of subordinate leadership to some young officer in the second triangle. As a matter of fact, while the R.A.F. is still expanding, young officers get plenty of chances of command. Nearly all available flying officers have been promoted to flight lieutenant, and nearly all the flight lieutenants have become squadron leaders. These are great days for promotion. Consequently, many squadrons consist of one squadron leader, one officer who is either a flight lieutenant or a flying officer, and the rest pilot officers and acting pilot officers. Many a flight has to be commanded by the most competent of the pilot officers.

The six Gauntlets of No. 32 F.S. circled and climbed, and soon could be dimly descried as small dots very high over our heads. They stayed up for an hour, and then came back and landed. Something seemed to have gone wrong with the reports, for though the visibility was wonderful they had seen no enemy aircraft at all. All that they had seen had been some other fighters up over Redhill, ten miles away.

While this flight was coming in to land the sun shone brightly on their silver sides and made a very pretty picture. It is rather sad to think that soon there will be no more silver aeroplanes in the R.A.F. Already the new bombers issued have been painted with the new green and brown camouflage, and soon the fighters will follow suit. The beloved squadron markings will also have to go, and no longer will the onlooker be able to say, "There goes No. 25 F.S. with its two black lines! That is No. 56 F.S. with its red and white chequers."

The fighter pilots say that if they are above the camouflaged bombers the new colour scheme does make it more difficult to spot them against the background of the earth, but when the fighters are below the dark paint shows up more clearly against the sky. In the War all our machines were painted white on the underneath sides and a sort of green khaki on the upper surfaces. That principle is surely the wisest, and one wonders why it has not been adopted once again. There cannot be much force in the theory that dark paint below hides machines from the searchlights.

No. 32 F.S. had most of the fun that night, for at 7.45 p.m. the maroon went again, and this time both flights were sent aloft. They disappeared in the direction of Tunbridge Wells. Twenty minutes later both flights of No. 79 F.S. were also despatched into the blue. One of them landed again in less than twenty minutes, the pilots jubilant because they had caught three Hinds over Tonbridge and had dealt with them. That was really smart work by the Observers and No. 11 (Fighter) Group Command. The Gauntlets had been sent up at just the right moment and with the clearest orders. Also, they had been in overwhelming strength. One rather wonders what three Hinds were doing by themselves within easy reach of a fighter aerodrome. In the real thing—may it never come!—it is to be hoped that our bombers will always be sent out in sufficient strength so long as it is daylight. Anyway, No. 79 F.S. deserve congratulations on a smart piece of work. They are one of the new squadrons, raised with one flight of No. 32 F.S. as a nucleus, and now up to full strength in Gauntlets while not too badly off for pilots. They put all twelve machines into the air on Monday.

Fury v. Gauntlet

Meantime, the sun was getting low, and the faces of the No. 25 F.S. pilots were growing longer. Sqdn. Ldr. Down had brought one flight with two extra machines up from Hawkinge, and they were all very much in love with the Fury II; rather anxious, in fact, to match it against the Gauntlets, which, they claimed, it could outclimb when comparatively near the ground, though they admitted that in the upper regions the Gauntlets could climb faster and fly faster. But the Fury, whatever its mark of Kestrel, has always been regarded as an intercepter, quick up, quick there, quick down, and has never been given any equipment which would interfere with that performance. So it has no navigation lights, and its chances of getting some fun that night were rapidly vanishing.

In the real thing—may it never come!—the question of pilot fatigue will have to be taken into consideration. All have to stand by for hours on end, and the times for meals in mess are altogether thrown out of gear. Cocoa in the pilot's room is some compensation—for those who like cocoa. Once at another station I have seen the squadron on duty lined up at the lee side of the aerodrome, with a cookery lorry beside them and a land line connecting them to the operations room. That was to save some minutes in taxying into the wind, and when the new speedy bombers have to be dealt with it will become important to save every minute in getting into the air.

F. A. DE V. R.

FAMOUS DESIGNER HONOURED

Rochester Presents Arthur Gouge with Freedom of City

RARELY has an honour been more thoroughly well deserved than that bestowed on Mr. Arthur Gouge, General Manager and Chief Designer of Short Brothers, by the City of Rochester when, recently, he was presented with the Freedom of that city.

The Mayor of Rochester, Alderman I. Granville Winch, presided at the ceremony. The Senior Alderman, Mr. F. F. Smith, recalled that Mr. Gouge, who was born at Northfleet, but has been with Shorts for 22 years, had worked his way up from the bench. By attending evening classes he obtained his B.Sc (Lond.).

Councillor A. C. Lyle referred to the early connection of Short Brothers with Rochester and recalled that they made their start at Eastchurch, where Lt.-Col. J. T. C. Moore-Brabazon obtained the first British aviator's certicate. In 1914 they transferred their works to Rochester, very generous terms being given by the vendor of the land on which the factory now stands, Alderman Charles Willis.

After taking the traditional oath, Mr. Gouge was presented with the scroll of admission and a silver casket in which to keep it. The casket bears on its lid a replica of a sailing ship, symbolical of the first crossing of the Atlantic.

In expressing his thanks for the honour bestowed upon him, Mr. Gouge said he was more than proud to think that his work and that of his colleagues had been thought worthy of adding a page to the history of the ancient city of Rochester (its written history goes back 2,000 years). There were some things which could not be judged by ordinary standards, which were beyond price; he so regarded the presentation of the Freedom of Rochester to himself, but shared the honour with those who worked with him.

Mr. H. O. Short, in commemoration of Coronation Year, presented a gold chain for the badge worn by the Deputy Mayor. He mentioned that a compliment had been paid his firm by engraving on the chain a series of plaques representing different Short aircraft types.

Celebrating

Following on the presentation a banquet was given by Mr. H. O. Short, managing director of Short Brothers, at which Councillor F. C. A. Mathews proposed the health of the new Freeman, who replied that he was proud of Rochester and proud of Shorts. Only with the help of a loyal and capable staff had he been able to achieve such success as had been won.

The Mayor of Rochester, in proposing the toast of Mr. Oswald Short, said that the name of Short would always be linked with that of Rochester. By their foresight and courage Mr. Short and his brothers had founded what was probably the best-known aircraft firm in the world.

Mr. Oswald Short said they all knew of the high scientific attainments of Mr. Gouge. They might, however be surprised that he (Mr. Short) claimed him as his baby. A very substantial baby! He had known Mr. Gouge for many years, but Mr. Gouge had known him even longer, as he was with the firm a good many years before Mr. Short came in close contact with him.

"I quickly realised his abilities," Mr. Short said, "at a time, I believe, when he in his modesty did not realise them himself." Mr. Gouge wanted the opportunity, encouragement and backing necessary to permit his talents to be exercised to their full extent. As head of the Short firm it was in Mr. Oswald's power to see that he got that backing and encouragement. He gladly gave them because he felt that Mr. Gouge was the man he was looking for. That was why he regarded Mr. Gouge as his baby, and he was proud of him.

Mr. Short also paid a very warm tribute to other members of the Short firm, some of whom were present and some who were not. Mr. Lankester Parker, for instance, was enjoying a well-earned holiday in Dartmouth. Parker, Mr. Short said, was talented in the courageous art of taking new monsters into the air to see if they were what the designers professed that they were! He knew of no finer service than that.

To Messrs. Kemp and Bibby, his co-directors, Mr. Short also paid tribute for their great achievements as production managers.* Wizards of technical knowledge and mathematics were such men as Mr. Lipscombe and Mr. Jackson. With other members of the firm too numerous to mention they made a fine team.

Continuing, Mr. Short said: "When I question myself as to how I have shaped in this world, a process which is accompanied by much self humiliation and belittlement, I say to myself that I have at least gathered around me many brilliant men, and I have retained for many years not only their services to the firm but their friendship and regard. That is a thought which lifts me out of those valleys of depression into which I occasionally descend, being by nature inclined to do so."

History

Mr. Short also recalled that thirty years have passed since his two brothers and he founded the business which has now grown to be one of the major industries of Rochester. They plunged into it because of its scientific interest and hoped to make it pay its way. Being young and ambitious, perhaps they hoped also that it would bring them fame and fortune. It had done both, but at times it had been a hard struggle. That they won through was due to the men sitting around that table that evening. They stood by the firm in hard times and worked for salaries much below what their merits entitled them to. He thanked them one and all.

He hoped, Mr. Short said, that he had at times inspired these brilliant men in the exercise of their talents, especially in connection with all-metal construction using light alloys, and the stressed-skin form of construction which was now rapidly superseding all other methods of construction. He claimed that that revolution began in Rochester nearly twenty years ago, and that it was thus entirely of British birth.

Mr. Short concluded by expressing his pleasure at seeing there that evening Councillor Chas. Willis, who sold them the ground they now occupied on a mere exchange of letters. "If there are any lawyers here to-night," Mr. Short said, "I hope they will forgive that simple procedure. It was what is called a 'gentleman's agreement.'"

* Mr. Kemp is in charge of the production of military types and Mr. Bibby of civil types at the Rochester works.—ED.

OFFICIAL KING'S CUP AIR RACE ENTRIES

Entrant.	Pilot.	Aircraft.	Reg. Mark.
Sir Connop Guthrie	Giles Guthrie	Percival Vega Gull	G-AFAU
Miss L. Dillon	Entrant and Capt. T. Neville Stack	Percival Vega Gull	G-AEYD
G. M. Tonge	Entrant	Percival Vega Gull	G-AEZK
W. Lindsay Everard, M.P.	Alan H. Hole	Percival Vega Gull	G-AELE
D. Schreiber	Entrant	Percival Vega Gull	G-AEZJ
C. E. Gardner	Entrant	Percival Mew Gull	G-AEKL
F. C. J. Butler	Entrant	Percival Vega Gull	G-AEZL
Wing-Cdr. P. Sherren	Wing-Cdr. E. G. Hilton	Miles Falcon	G-AENG
Henry S. Horne	Flt. Lt. T. Rose	Miles Hawk Speed Six	G-ADGP
F. G. Miles	Entrant	Miles Hobby	G-AFAW
Major E. Howard	Wing-Cdr. F. W. Stent	Miles Sparrowhawk	G-ADNL
Sqn.-Ldr. A. V. Harvey	Entrant	Miles Whitney Str'ght	G-AEVH
E. J. Jobling-Purser	Entrant	Miles Whitney Str'ght	G-AEWK
C. S. Napier	E. C. T. Edwards	Miles Magister	G-AEZP
Brig.-Gen. A. C. Lewin	Entrant	Miles Whitney Str'ght	G-AEZO
F. E. Tasker	F/O. A. E. Clouston	D.H. Comet	G-ACSS
V. Dupree	H. F. J. Broadbent	B.A. Double Eagle	G-AEIN
W. C. Potter	C. H. Willis	B.A. Eagle Mark I	G-ADID
C. M. McCarthy	Entrant	B.A. Eagle BKI	G-ACRG
C. S. Napier	H. R. A. Edwards	Wicko	G-AEZZ
C. S. Napier	H. H. Leach	Hendy 302	G-AAVT
W. H. Moss	Entrant	Moss Monoplane	G-AEST
J. I. Waddington	Charles Hughesdon	C.W. Cygnet	G-AEMA
W. L. Hope	J. K. Quill	Comper Swift	G-ABWH
H. O. Short	H. L. Piper	Short Scion Senior	G-AECU
Viscount Wakefield of Hythe	R. J. Waight	T.K.4	G-AETK
Capt. G. de Havilland	F/O. G. R. de Havilland	T.K.2	G-ADNO
S. T. Lowe	Entrant	Comper Swift	G-ABWE
Alex. Henshaw	Entrant	Percival Mew Gull	G-AEXF

Late Entry: Entrant, Viscountess Wakefield; Pilot, E. W. Percival; Aircraft, Mew Gull; Reg. Mark, G-AFAA

COMMERCIAL AVIATION

THE WEEK AT CROYDON

Holiday Traffic : Long-range Radio : The Phantom Flyer : Ante-dated

LAST week's prognostication of the Bank Holiday traffic was justified. During the week there were 7,000 passengers through Croydon, and I do not think there have ever been a thousand a day before. It naturally takes quite a big number of machines, large and small, to carry these people, and you then get traffic congestion, so the Air Ministry announcement about Heston is extremely welcome. No doubt it is to be made into a first-class aerodrome in every respect, with the big air liner of the future in view. Hangarage will be a problem, presumably. Does one build for the very big plane of the future, and, if so, will not the said machine be all-metal and perfectly capable of sitting out at anchor all night and every night? They say several of the smaller firms will move to Heston as soon as possible, though this is mere rumour. Both managers of big firms and control-tower people feel that if there were only (say) four of the really old-established air transport concerns at Croydon, those four could increase their traffic enormously without danger or difficulty, as the discipline amongst pilots and the give-and-take you get from old hands who understand their business thoroughly mean an immense amount in traffic control.

Amazing strides wireless has made, to be sure, since the days when pioneer Marconi men, some of whom are still with us, were shut up in freight compartments, in a sitting position, unalterable by reason of the confined space, for three or four hours. I think they used to travel this way with their experimental wireless sets on the D.H.18, or some such craft, to Paris. The other day one of the K.L.M. machines had a black mark for not attending to Control Tower for about six minutes, and an "Aircraft Radio Faulty Working Report" was duly made out. Apologies were tendered, and it transpired casually that the Douglas D.C.3 somewhere between the coast and Croydon had been working short wave with Sydney, Australia, and had informed that station that he would be landing at Croydon in ten minutes. Sydney said reception was excellent, and Croydon accepted the pilot's apology!

Tinned Beer

I had a bottle of admirable tinned beer the other day (outside the three-mile limit, of course) which K.L.M. is serving on aeroplanes, and this, the steward said, is extremely popular on the Amsterdam-Batavia route, which, incidentally, is to be three times weekly in each direction after October 1, 1937.

Surrey Flying Services, Ltd., had bumper crops of pleasure flyers over the holiday period, I am told, and carried over 700 passengers, as well as making some half-dozen or so special flights either internally or abroad. One of their pupils (*ab initio*), Mr. Griffiths, made an excellent first solo after only 3½ hours dual. Incidentally, Mr. Griffiths' mother is also training for her "A" licence with Surreys.

One of the Croydon companies had the queer job of receiving racing pigeons as freight from Czechoslovakia and releasing them, in the presence of a Customs official, at a set time from the Airport, thus avoiding import duty, I understand. The instructions contained a clause that they were to be released only at a spot free from obstacles, which shows they have much in common with air liners besides special navigation facilities enabling them to find their way home. I am informed that they made a couple of left-hand circuits, "dipped" respectfully to the Control Tower, and set off for Czechoslovakia at full speed.

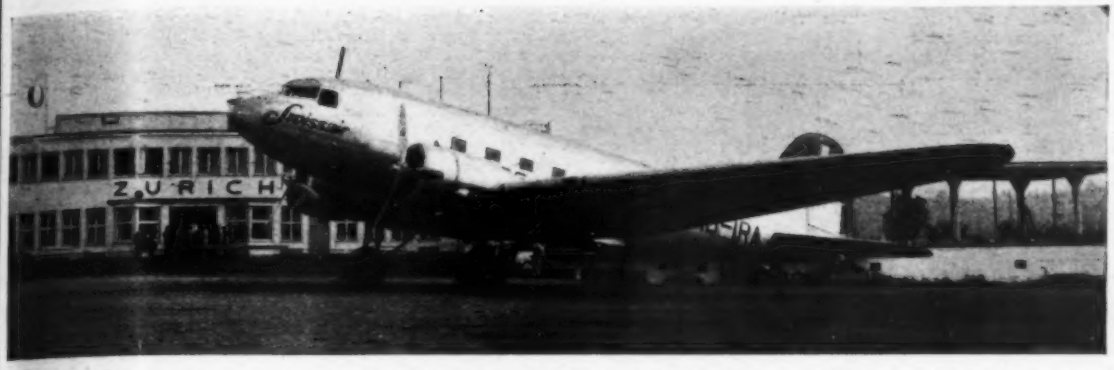
Week-end return tickets, without passports, are a novelty on the K.L.M. services. The scheme has, however, been in force for a long time on the Paris line. Available only for British and Dutch subjects and by K.L.M., these tickets can only be obtained between London and Amsterdam or Rotterdam, and are valid from Friday to Tuesday. British subjects are advised to carry with them some means of identification.

The following quotation from the "Stop Press" of an evening paper can be given without any comment except that even our members of Parliament seemed to know *all* about the "Phantom Flyer." Here it is, *verbatim*. "Phantom Flyer again. Noise of aeroplane engine heard over the City of London early to-day. Air Ministry said they had no observers watching; they 'knew nothing about anything.'"

One of the Croydon companies has just been presented with a phenomenal bill for housing charges over a period of a year or years, because the authorities had measured one of their machines up wrongly and charged too little for ever so long. Luckily for the Air Ministry the firm is an old-established one, and not one of the here to-morrow and gone to-day (or vice versa) type. The answer, of course, is pay up and look pleasant, for the Ministry can do no wrong, and a couple of Senior Wranglers are kept solely to measure wing-spans. As Uncle Remus would have said: "It ain't no manner of use 'sputing along of Air Ministry folkses, honey," and the whole situation is aptly summed up by the same dusky authority when he says: "De word went roun' dat ole man Squinch Owl done ketch annuzzer watsioname." The word "mug" was not invented in Uncle Remus's day. Whilst we are talking of that admirable character, did you know that Brer Rabbit was the first air-line captain? He was, as the following quotation shows: "Den Brer B'ar, he ax Brer Rabbit what he doin' up dar in de elements, en Brer Rabbit he up and say he makin' dollar a minnit."

Some 22,216 passengers used Croydon during July, excluding Irish passengers. The last bit seems to be another injustice to Ireland, and the reason for the exclusion seems obscure.

A. VIATOR.



One of Swissair's two Douglas D.C.3s with the Dubendorf terminal building in the background. Behind the tail of the machine is the open-air public restaurant.

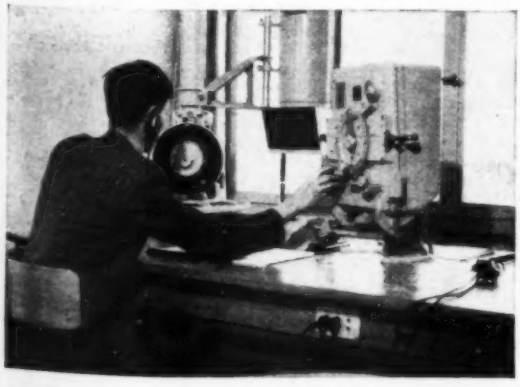
THE MODERN TOUCH

How the Technique of Transport Flying is Changing : Swissair as an Example

DESPITE the pathetic wailings of those who cannot become accustomed to the idea of radical change which, in particular, involves a dependence on mechanism rather than muscle, the entire technique of transport flying is slowly but surely being modified. The need for absolute regularity alone has involved the use of new methods of navigation, and the appearance of the high-speed transport, with its specialised flying characteristics, has finally put an end to the old order of things.

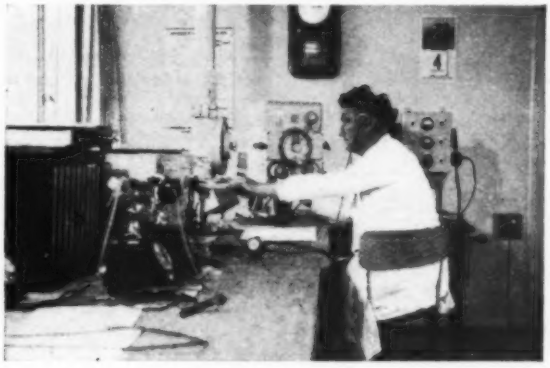
It is no longer possible to fly by half-and-half methods —one eye cocked at what can be seen of the landscape and the other at a few half-trusted scientific devices. Either one's equipment is such as to be trusted explicitly or one might just as well stay on the ground. Trees, church steeples and mountains are fixed and final obstructions to any rule-of-thumb flying at three miles a minute.

Those operators and pilots who want to see just how modern air transport work can be carried out might well use the Swissair Company as their model. Other companies probably have equipment which is equally up to date and use training methods which are equally thorough, but Swissair has the advantage of being a comparatively small concern and most of the organisation is neatly centralised at Dubendorf Airport, Zurich, which is managed by Mr. Bettge. Furthermore, the local conditions are such that really accurate navigation and approach work at the Swiss terminal are essential for safety, and no effort has been spared in the endeavour to keep the necessary equipment as up to date as it is possible to be.



In the new radio station at Dubendorf : working the "outside" D/F equipment with its device for combating night error.

After Tempelhot, where the original experiments were carried out, Zurich, for instance, was the first airport to be equipped with the Lorenz ultra-short-wave approach system and this appears to have worked well during the last two years or so.



Another interior view of the radio station showing the "controlled zone" equipment with the Lorenz repeater on the right.

In the issue of February 20 last year the company's equipment and methods were fully described, but since that time a new radio centre has been built and equipped with the very latest material, and two Douglas D.C.3s, with a diesel-engined Junkers 86, have been added to the fleet. The radio centre alone is worth careful investigation, with its indirect lighting to reduce all possible interference, its spacious layout and its traffic control arrangement.

Blind Approach

The QBI approach line to Dubendorf is 325 deg. True (QDM 151 deg. Mag.), a direction chosen because of the reasonable flatness of the country passed over, the length or run available on the airport itself and the fact that the approach is started from the Rhine valley, which can, if necessary, be followed from Basle. On this line, starting backwards from the south-east boundary of the airport, is the main approach beacon, a thousand yards of landing area, the two-storey terminal building (already overcrowded), the second marker beacon, the D/F station, the first marker beacon, an auxiliary medium-wave beacon and the main transmitting station—the last two at Kloten, four miles from the aerodrome. Whether a pilot is coming in on bearings by the ZZ system, by means of his own D/F and homing equipment, or on the ultra-short-wave beam, his approach is made on 151 deg. Mag. Could anything be more perfect than that?

Commercial Aviation

The Swissair pilots use all three methods, each one a check on the accuracy of the other two.

In conformity with the modern practice, two medium-wave radio channels are used, one (900 m.) for general work, and the other (932 m.) for what we call controlled-zone work. Each, of course, has its own D/F equipment and all the material, except the Lorenz repeater and test panel, is manufactured by Telefunken, and is arranged in two groups on one side of the room. On the other are the usual D/F plotting charts and so forth. With the main D/F equipment is incorporated a Telefunken device, of which little has been heard in this country, for the purpose of combating night error. Briefly, a cathode tube is used to sort out the direct from the indirect waves (those reflected from the Heaviside layer). Unfortunately, it is necessary for the aircraft's own transmitting equipment to be modified accordingly before this system can be used and it appears likely, for obvious reasons, that Zurich will eventually have a variation of the Adcock system. Swissair's fleet has modified radio equipment, but other machines can only be brought in at night on uncorrected bearings.

Traffic Control

Instead of the flag-placing method in use over here for keeping track of incoming and outgoing machines, the Dubendorf operators use an ingenious time and distance chart. All the regular services are indicated by lines drawn on this chart according to their scheduled ground speeds, with the result that all possible intersections in time and space are shown, and the pilots arrange their different operating heights accordingly. Only where the conjunctions are numerous is it necessary for the operators to take personal charge of affairs. When two or more services are likely to be approaching Dubendorf at approximately the same time in bad weather the pilots are informed well in advance and can adjust their ground speeds (and resultant E.T.A.s) accordingly. It is consequently rarely necessary for a pilot to hang about in the vicinity of the airport while others are coming in. Swissair machines are usually flown at 12,000 ft. or so, and radio-obtained positions require slight modification owing to height error.

In the workshops on the aerodrome Swissair now has a special shop for erecting and testing instruments—and, in particular, automatic pilots. The plant used is very complete and the engineer there, before taking charge, spent six months at Sperry's factory in England.

Returning to Croydon, after the first three days of the Zurich International Meeting, in one of the new D.C.3s, I was lucky enough to spend some time in the control cabin with Capt. Heitmanek while the machine was flying above the clouds at 12,500 ft. between Montbéliard and St. Dizier. The D.C.3, of course, has constant-speed airscrews and the captain carries a chart to enable him to get the most economical all-round results from his two Cyclones. We were flying on 50 per cent. full power at a corrected air speed of about 170 m.p.h., with the exhaust gas analyser needles right over on the fully weak position. This Cambridge device is normally used in conjunction with cylinder head and base temperature gauges. The outside temperature was just zero yet it was warm enough back in the cabin and only pleasantly cool in the control cabin. It was interesting to see that, of the five pairs of engine control levers, those for airscrew pitch regulation are longest and nearest to the first pilot. Once off the ground the throttles are of minor interest only. Needless to say, during the period which I spent up in front the D.C.3 was being flown entirely by the Sperry. Those two little points alone show how flying technique itself is changing side by side with the navigational methods. H. A. T.

Navigation Schooling at Croydon

FOR the convenience of Croydon pilots, Mr. C. W. Martin proposes to open a branch of the Imperial School of Air Navigation (the H.Q. of which is at 41, Arundel Gardens, London, W.11.) within five minutes' walk of the Airport; he is first anxious to know how many people would be interested.

On Demand to the I.O.W.

AIR COMMERCE, LTD., of Heston, are now operating an "on demand" service to the Isle of Wight, the fares being 29s. and 46s., single and return. In the normal way there will be two return services on Saturdays and Sundays, and one each on Fridays and Mondays. Lea Airport is used.

The Zeppelin Outlook

AS a result of investigations by the American Lakehurst Committee into the *Hindenburg* disaster on May 6 it has been officially decided to continue the development of airship passenger traffic. A new revolving hangar at Frankfort should be completed in the spring of 1939.

It is hoped that the new helium-filled dirigible L.Z.131 will be finished before the end of the winter, permitting the immediate resumption of services. The glorious old *Graf Zeppelin* is now being used as a museum.

Layer Flying

UNITED AIR LINES, in addition to establishing minimum altitudes for their coast-to-coast run, have directed pilots to fly only at certain height levels—6,000, 8,000 and 10,000 ft. on the westward run, and 7,000, 9,000 or 11,000 ft. on the eastward run, according to the height of the terrain. It is not necessary, therefore, for pilots to be warned of the proximity of other machines, or for the ground staff to be on the look-out for possible intersection of flight paths. Changes of altitude must, of course, be reported by radio.

Imperial Airways' Train

THE further wanderings, for August and September, of Imperial's demonstration coaches (mentioned on page 103 of *Flight* for July 22) will be as follows: The first date in each case is the official opening and private view, and the others are for public view: Birmingham, New Street Station, Monday, August 23-26. Coventry, Friday, August 27-30. Wolverhampton, Tuesday, August 31-September 3. Colwyn Bay, Friday, September 3-6. Chester, Tuesday, September 7-9. Stockport, Friday, September 10-13. Manchester, Victoria Station, between September 13 and 20. Liverpool, Lime Street, Monday, September 20-23. The train is never on view on Sundays.

Through to Berlin

ON August 9 a British Airways' Ju.52 left Croydon for Berlin at exactly 10 p.m., inaugurating the extension of the night air service for first-class Continental mail. The carriage of the mail on the new extension will be undertaken in co-operation with D.L.H., who will carry the mail on alternate nights.

Canada Opens Up

MR. C. D. HOWE, the Canadian Minister of Transport, made the official survey flight over the probable air-mail route across Canada from Montreal to Vancouver on July 30. The Lockheed Electra used made the trip at an average speed of 167 m.p.h. and was flown by Sqn. Ldr. Tudhope of the Royal Canadian Air Force. Stops for refuelling were made at North Bay and Sioux outlook in Ontario, and at Winnipeg, Regina and Lethbridge.

Meanwhile, as already reported, seven Electras and four Lockheed 14s have been ordered by Trans-Canada Air Lines.

The P.A.A. Disaster

THE hull of a Pan American Sikorsky S.43 which left Guayaquil, Ecuador, on August 2 for Cristobal, at the eastern end of the Panama Canal, was found the following day under the water thirty miles north-east of her destination. Among the eleven passengers were Mr. Rex Martin and Mr. C. Q. Caldwell of the U.S. Department of Commerce.

A U.S. Navy machine—one of several sent out to search—reported finding the centre section, minus engines, twenty miles from Colon breakwater.

The pilot of the Sikorsky reported in his last radio message that apparently he had overshot Cristobal, and that he was seeking a gap in the clouds to make his descent.

Severn Ferry

THINGS are still moving in the Middle West. Weston's airport is now fully equipped for night flying with a three-lamp Chance floodlight unit and the usual boundary and obstruction lights and a wind tee. A control tower has been erected behind the floodlight.

During the August holiday period—from the 1st to the 9th—Western Airways carried 2,750 passengers, mostly on the ferry service between Weston and Cardiff. In August, 1935, 161 passengers were carried during the same period between Bristol and Cardiff. Almost inevitably the ferry fares have now been slightly increased, but this increase seems to have had little effect on the volume of traffic. Which goes to show that, within reason, passengers do not mind paying for the comfort and swiftness of air travel..

PRIVATE FLYING

Topics of the Day

Gone Marine

WE who pride ourselves on making long dead-reckoning cross-country flights and arriving vertically over our terminal aerodrome hardly know how complicated real navigation can be. Disregarding the very slight changes in magnetic variation, there is only one exterior factor—wind speed and direction—to be dealt with when we plot our courses.

Last week I spent, by way of a change, doing a little amateur ocean sailing and fell more or less naturally into the job of navigator, thereby learning a very great deal. All my previous sailing had been done while in sight of land. Forgetting the ordinary business of chart-reading, which came fairly naturally to me, the navigator of a sailing vessel has tides and lee-way for which to account, and it is, furthermore, not usually possible to sail in a straight line towards an objective. Apart from the necessity of avoiding sundry obstructions in the way of sharp rocks, one's track must be adjusted according to the direction of the wind, which has an annoying habit of changing just when a complete plan of action has been plotted.

It is not, in fact, possible to arrange any plan in advance and without the use of such things as D/F radio and sextants a certain amount of intelligent guessing is essential. For instance, on the crossing between St. Catherine's Point (I.O.W.) and Alderney, with tides running in alternate directions across our course, it was permissible to ignore their effect.

Nevertheless, if a landfall was to be expected (according to the trailing log) in an "extra" tide one way or another, some allowance would have had to be made for it, and this allowance could only be guessed. In fact, after sixteen hours of fog we hit Alderney spot on and pretty well sailed straight into the harbour at Braye; in another hour considerable allowance would have had to be made for an additional westerly tide and for the tidal race which rushes past the north coast of the island. People who think that the tides simply go up and down would be surprised to learn that seven- and eight-knot currents are to be expected around the Channel Islands.

New Methods

NONE of which has much direct connection with flying, though the sound of two Jersey Airways' D.H.86s during the Channel crossing provided a comforting check on our movements. Fortunately, I remembered that neither Exeter nor Brighton services ran on Thursday.

When there is anything at all to be seen a bearing compass can be used very successfully at sea, since, however good the visibility, it is very difficult to estimate distances and one's consequent position. All marine charts have a compass rose laid out according to the magnetic variation at the time of publication. This variation changes very slowly and the quickest way of obtaining the actual magnetic bearing of any particular track is to use a parallel rule—"marching" this, if necessary, across the chart. Usually it is posible to reach a rose on one extension.

Unfortunately, our four-mile aviation maps are merely printed with a variation arrow. Most of one's tracks are, however, drawn first on ten-mile maps and on these a complete compass rose is printed. I shall immediately equip myself with a parallel rule for such plotting work; the method of using a protractor against a convenient meridian now appears to be a trifle crude. Though the printed roses are only correct for the particular part of the map or chart on which they appear, and the variation alters slightly year by year, the parallel rule method leaves less possibility of vital error. Our present flying maps are, however, not laid out on Mercator's projection, and I may find that there is rarely a convenient rose available to give a correct bearing. Between Great Yarmouth and Land's End on a ten-mile map with Cassini's projection the angles of the meridians vary six degrees in relation to one another.

Since our compasses have verge rings or cards calibrated through 360 deg. it was not possible to become accustomed immediately to the marine type, the card on which is calibrated in thirty-two points (each of 11.25 deg.) with degrees marked up to ninety East or West of North and South. A magnetic bearing of 300 deg., for instance, is indicated as 60 deg. W. of N. (or about three points N.W. of W.), while one of 100 deg. is shown as 80 deg. E. of S. (or about one point S.E. of E.). The "point" method of indication is very necessary in marine work, as it is usually impossible to read the actual figures on a compass card from one's position beside the wheel—particularly in rough weather. The ninety-degrees scheme of calibration has one considerable advantage: a reciprocal bearing can be obtained at once simply by reversing the reading. The reciprocal of 80 deg. E. of S., for instance, is 80 deg. W. of N. I never can do a three-figure sum in my head.

Ignorance

IT has always been surprising to me that anybody ever manages to find out about air services, even if he or she prefers to travel by such means. People in general simply do not know of the existence of such things.

Somehow or other I had got to get back from Alderney to the mainland in the quickest possible manner, yet I wandered from one steamship company and travel agent to another in Guernsey and ran up against a blank wall every time. Yet I was in the exceptional position of *knowing* that Jersey Airways ran between Alderney and Jersey, and between Jersey and the mainland. What of the ordinary mortals who do not even know that?

Eventually I found the agent for Jersey Airways, and he got through to Jersey Airport, and we fixed everything up. But let it be placed on record that the ordinary agent and steamship enquiry man knew nothing and cared less.

INDICATOR.

Private Flying

FROM the CLUBS and SCHOOLS

LONDON

MR. E. TOWNSON completed the tests for his "A" licence and Mr. W. S. Phillips carried out his "B" licence night flight. The total flying time for the week ended August 7 amounted to 137 hr. 20 min.

BORDER

The Border Flying Club deeply grieves the passing of its President —Mr. Harold Carr, J.P.—who died on Tuesday, August 3. The club was closed, and no flying took place, on Wednesday, the day of the funeral.

C. A. S C.

The holiday season is still affecting attendance at the aerodrome but on Sunday several members put in an appearance and flew 5 hr. 45 min. It was pleasant to see two of the Corps' ex-instructors when they paid a visit last week.

REDHILL

Cross-countries to Weston-super-Mare, Gloucester and Exeter, and trips to Le Touquet, have helped to swell the flying time to 106 hr. 40 min. Messrs. Waterfield and Brister made first solos and six new members have joined.

CAMBRIDGE

Cross-country tests for the "B" licence were completed by Mr. Mitchell, but bad weather delayed his night flight. The Puss Moth returned from Cannes, *via* Paris and Lympne, and cross-countries were made to Clacton-on-Sea and Hatfield.

YORKSHIRE

Interesting cross-country flights last week contributed largely to the flying time of 77 hr. 10 min.; visits were made to Blackpool, Liverpool, Scarborough and Hatfield. Messrs. S. E. Brown, G. W. Brown, J. A Clay and H. Heaton made successful first solos.

LEICESTER

The report of July shows 131 hours' flying. Mr. A. B. Crankshaw made his first solo in the early part of the month and fifteen different aerodromes were visited during cross-country flights. A Dawn Patrol was held and 27 machines attacked the aerodrome.

MIDLAND

The flying times for the week ending August 6 amounted to well over 56 hours. Mr. A. Edwards passed his "A" licence and Mr. A. J. Lambert made his first solo flight. Cross-country flights to Tollerton, Braunstone and Christchurch contributed to the flying time.

STRATHTAY

Twenty-two hours were put in during the week ended July 31, bringing the total flying for the month up to 98 hours, dual instruction representing 45 hours. New pilot members are Miss Matthew and Mr. Robert Bell, whilst Mr. R. B. Henderson carried out his first solo.

NEWCASTLE

In spite of a crop of sea frets proving a big handicap to flying activities during the past two weeks there is still every hope that last year's record of 2,200 hours will be broken this year. Two Club members—Mr. Jobling-Purser and Mr. Mackay—will fly a Whitney Straight in the King's Cup Race.

HANWORTH

Mr. Charles Coborn, who takes a flight every year to celebrate his birthday, has duly solemnised his 85th. Several cross-country flights were made last week and 143 hr. 45 min. flying was logged. Messrs. F. Jude and J. Brady have completed "A" licence tests and Messrs. N Raval and L. Fourie made their first solo flights.

BROOKLANDS

Flying times for the week totalled 137 hours, during which time Miss Hollum and Messrs. Doble and Cooper made first solos. Mr. J. Pearson, after only five hours dual, also went solo and is hoping to pass his "A" licence tests almost immediately. On Saturday, August 14, a petrol model aeroplane competition will be held at 3 p.m. and a speed judging competition will take place on Sunday. A new member—Major E. L. Gower—commanded a Royal Air Force Squadron during the war and was actually flying Bleriots as far back as 1911.

NORFOLK AND NORWICH

A record flying total (81 hours) was logged last week, 30 hours being contributed by the boys attending the Public Schools Aviation Camp. Mr. M. C. Barnes made his first solo. Two Club aircraft were sent over to the Cawston fête to give an aerobatic display which was run in conjunction with height-guessing and speed-guessing competitions. The Round Table have asked as their speaker for the next meeting Mr. J. D. Taylor, of the Air League of the British Empire. The meeting is to be held at the Thatched Restaurant and members of the club are invited.

SOUTH COAST

Holidays and better weather resulted in over 50 hours' flying. An informal dance is being held at the Club on August 21.

NORTHAMPTON

A landing and cross-country competition has been organised, the competition period ending on September 30. A silver cup will be held by the winners of each event for a period of six months. Seventy hours' flying was recorded last week.

YAPTON

Under excellent weather conditions over 66 hours' flying was carried out during the week ended August 7. Mr. Swift Coleman has successfully passed all his "B" licence tests and Mr. J. N. Somers has qualified for his "A" licence.

WITNEY AND OXFORD

Arrangements are being made for an arrival competition to be held every Sunday morning, the prizes being free lunches and refreshments. Flying times for the week ended July 31 amounted to 52 hours, 40 hours of which represented solo flights.

HULL

Ninety-two hours' flying were completed in July, 51 hours being instruction. Mr. M. Rickland carried out his first solo early in the month and has now qualified for his "A" licence. Mr. E. Loades and Dr. E. B. Upton Jones also went solo. There are seven new members.

A.S.T.

Two new machines have been acquired by Air Service Training—a Dragonfly and a Miles Whitney Straight. The Dragonfly is fully equipped with night-flying instruments and wireless apparatus for direction finding and ground communication. Many flights have been made to the Continent and twenty-five newcomers have made an appearance during the month. Two additions to the staff are Flt. Sgt. J. A. Newton (Flying Instructor) and Cdr. C. D. Bury (Navigation Instructor).

HYDERABAD

The Hyderabad State Aero Club, which has a flying membership of forty-four, recorded 79 hr. flying during June. Mr. P. M. Reddy has been appointed as assistant instructor. The Club has just reopened after having been closed for the summer holidays during May. Vicomte de Sibour was among the many who landed during the month of June. He was touring India by air in a Dragon and left after two days for Madras. Lt. Mehdi Ali made his first solo flight during the month.

SOUTHEND

No. 605 Squadron, Auxiliary Air Force, is now in camp on the aerodrome, replacing No. 602. No. 607 is expected early next week. A dance was given for the officers in the clubhouse on Saturday, August 7, complete with cabaret show. Additional turns were contributed by Miss Paddie Naismith ("A" licence) and Miss Phyllis Robins, the radio artist, who is also air-minded. A smoking concert has been arranged for Thursday, August 12, and a Farewell Dance to No. 605 Squadron on August 14. In spite of these activities, flying times have remained excellent, the new Leopard Moth being particularly busy.

CINQUE PORTS

Preparations for the 1937 Air Rally fixed for August 28 and 29 are going ahead rapidly. As usual, there will be 5s., 2s. 6d. and 1s. enclosures and in addition boxes to seat six at £2 2s. and £1 1s. are available. As there is only a limited quantity of the latter, early application should be made. Mr. Noel Coward, a vice-president, has been a frequent visitor, putting in a considerable amount of flying. Mr. Harbin is taking the Puss Moth to Paris, *via* Marseilles, for the Rally, and Lord Crichton Stuart has taken the Leopard to Ostend for a few days. Fine weather is responsible for the 90 hours' flying recorded during the week.

The Lympne International

ACCEPTANCES by Continental pilots for the Cinque Ports International Air Rally on August 28 and 29 have been coming in fast, and it would seem that the Club will need to entertain twice as many guests this year as last.

Since it is extremely difficult to hold the necessary accommodation without guaranteeing to take it, the Club has started a "Guinea Fund," and the help of private owners as well as members is asked for. Needless to say, subscriptions are not limited to a guinea and it is hoped that those who can afford it, and who wish to help to return the hospitality extended to them when abroad, will give several guineas.

ARE DISTANCE RECORDS PLAYED OUT?

The Case for the Private Venturer

By H. L. BROOK

ARE record flights worth while? Do they do any good to aviation? Are they merely stunts that show nothing but the skill (or foolhardiness) of the pilot?

I wonder how many times these questions have been asked, and if a satisfactory conclusion has yet been arrived at? Most probably not; opinions vary so much that it is doubtful if a conclusion ever will be reached. Nevertheless, I think that it is definitely possible to say that, provided a flight is successfully concluded and conducted in the right spirit, and all nonsense about "pioneering," "showing the flag" and what-not cut out, it does a lot of good to British aviation, and in a smaller degree to numerous other interests as well.

Mr. H. L. Brook.

However, whether record flying does good or not, the fact has to be admitted that under present conditions this branch of aviation is dying a natural death, and I cannot help feeling that it is a pity it should be so. The reason is an obvious one—the question of finance. Few of those engaged in such flying are able to back their own efforts and every year the chances of remuneration are getting less and less; in course of time they will dry up altogether.

If long-distance record flights do not serve any useful purpose then let them fade out, and as far as this country is concerned we shall probably see very few more of them. On the other hand, if they are doing good to aviation then they should be kept going, and are just as much worthy of Government support as are the flying and gliding clubs, which latter are admittedly purely sporting affairs, and serve no practical purposes.

Is it not a fact that the Government subsidises the flying clubs mainly for the purpose of creating an interest in aviation, and for no other purpose? Surely it must be admitted that only a small proportion of "A" licensed pilots could be used in time of national emergency without a great deal of additional training—in fact, quite a large number, of which I am one, would not be able to pass the R.A.F. medical examination, which is extremely strict as far as physical standards are concerned.

Therefore, for what other purpose than that mentioned above does the Government support the clubs? If record flying is serving this same purpose then it should have the same support.

I think it has to be admitted that a successful flight, even now, does create quite a lot of public interest, and if it is a particularly unusual affair will receive notice in the Press of the whole world. The pilot's remarks, his performance, and the make of his machine will all be set down and duly read by millions of people. Although it may be only for a short time while he or she is on the crest of the wave, the record-breaker will receive about as much publicity as a film star or leading politician. If he is of patriotic disposition he will constitute himself a sort of unofficial ambassador for British goods, and endeavour to tell the world how much better they are than anybody else's—and all this for what nowadays amounts to a few hundreds more than the bare expenses of the flight, unless, of course, the "hero" has lived such a romantic and lurid existence that some newspaper will buy the story of his life.

It has been said that even a successful record flight, instead of doing any good to aviation, does it harm, as it is apt to make people regard flying as a "stunt," and the sort of thing that no sane man would think of going in for. Personally, I think that this is absolute nonsense. I do not believe that even an unsuccessful attempt does the slightest bit of harm. Most people know that the record pilot has to take risks that would never be taken by pilots in the ordinary way, and if he crashes, well, it's just too bad, and is his own look-out, anyway.

Whether the effect of record flying is good, bad or indifferent one thing is quite certain; that to the average individual (unless, of course, he is backed by some wealthy sportsman) record flying is no longer worth doing from a financial point of view; and while the physical risk is nothing like so great as most people seem to imagine, the financial risk is a very real one.

I know that in my own case, although the actual flying has been great fun and I have now financially come out well on the right side, there have been times when it was necessary to take what were really foolish monetary risks—for instance, coming back from Australia with no insurance whatever on the machine, my own property.

Unless Government aid is forthcoming, this year will probably see the end of record flying, and one more field of adventure will have disappeared from an already prosaic world.

[Though we do not necessarily agree with all Mr. Brook's contentions, we feel that his article is one on which readers will be eager to comment.—ED.]

An Italian Rally

TO encourage private air touring in Italy, a rally and race for aircraft of from 85 to 400 h.p. is to be held this month. The rally will take place on August 22 and 23 at Rimini, the Adriatic bathing resort, and the race will be held on three days, August 25, 27 and 29. The total distance of this race is 1,220 miles.

Details and entry forms may be obtained from the Royal Aero Club or from the Italian State Tourist Department, 38, Piccadilly.

Eastbourne at Home

THE EASTBOURNE FLYING CLUB will be at home on Saturday, August 14, and the party promises to be one of the season's brightest. Captain E. I. Short has been at work with his usual zest for organising such affairs, and tells us that sixty pilots have accepted invitations. Three will fly from Germany, two from Holland, one from Belgium and one from France. Some distinctive prizes are up for competition and will be distributed by Mr. Hore-Belisha.

It should be noted that the arrival competition, scheduled originally for 1.30 p.m., has now been arranged for 12.30-2.30; this event carries two awards. Thirty-six entries have been received for the Concours d'Elégance.

No. 600 (F.) Squadron will perform from 4-4.30 p.m. (during which period arrivals by air will not be welcomed); Mr. Ben Turner will make a parachute descent and there will be a variety of demonstrations in the normal tradition of such aerodrome parties.

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

BOMBER GROUP COMMAND

The Air Ministry announces the following appointment:—Air Commodore William Bertram Callaway, A.F.C., to assume command of No. 5 (Bomber) Group, Royal Air Force, with effect from August 17, 1937.

Air Comdre. W. B. Callaway was appointed to the Royal Naval Air Service as acting Flight Lieutenant in 1916, having previously been commissioned in the Royal Navy, as Paymaster Lieutenant in 1912. For distinguished services during the Great War he was awarded the Air Force Cross and was also mentioned in despatches. In 1919 he was granted a permanent commission in the Royal Air Force, with the rank of Flight Lieutenant.

From January, 1927, to December, 1928, Air Comdre. Callaway attended a course at the Army Staff College, Camberley. He was posted to Headquarters, No. 10 Group, for Air Staff Duties early in 1929, and later that year was appointed Senior Air Staff Officer on H.M.S. *Furious*. After a period of three years' service at the Air Ministry in the Department of the Chief of the Air Staff, he was appointed to command the Royal Air Force Base, Calshot, in September, 1933, and since April, 1936, has commanded No. 203 (Flying Boat) Squadron.

He was promoted to Wing Commander in 1926, to Group Captain in 1933, and to his present rank on July 1, 1937.

EXPANSION PROGRESS

The expansion of the R.A.F. has proceeded according to schedule. Up to July the strength of the Metropolitan Air Force had increased to 123 squadrons with a first-line establishment of 1,542 aircraft, though some squadrons are not at full strength. The number of new stations, including armament training camps, already opened totals 22.

Since April 1, 1935, some 3,500 pilots have been selected and about 3,100 have commenced training. The total number of airmen entered from the same date is 22,300. At Cranwell and Halton about 4,750 aircraft apprentices are under training and 1,058 boy entrants are also being trained.

R.A.F. COLLEGE, CRANWELL

Field Marshal Sir Cyril Deverell, G.C.B., K.B.E., Chief of the Imperial General Staff, inspected the R.A.F. College, Cranwell, on July 30, on the occasion of the passing out of Flight Cadets. The following are extracts from the report of the Commandant:—

There are 147 Flight Cadets at the College. Flying training has proceeded in accordance with the new syllabus by which it is divided into three phases, each lasting two terms. The VI Term has completed its training in accordance with the new syllabus and has attended an Armament Training Camp for four weeks.

The standard of aerobatics has been adversely affected by the restrictions on Tutor aircraft. Aerobatics could, in consequence, only be given to Flight Cadets on Hart type of aircraft.

Instrument flying is not now treated as a separate form of training. The use of instruments as an aid to flying is explained to Flight Cadets who practise flying with instruments after approximately five hours on the elementary type of aircraft. All Flight Cadets of the entry now passing out have flown solo at night.

The standard of navigation remains satisfactory and there has only been one instance of a Flight Cadet losing his way on a cross-country flight and that occurred in difficult weather conditions in January.

The average time flown by Flight Cadets now passing out is 214.50 hours dual, solo, and observer flying: observer flying includes time spent in the air on such duties as bomb aimer and rear gunner.

During the period under review, November 15, 1936, to May 31, 1937, the total number of Flight Cadets admitted to hospital was 66 as compared with 60 during the corresponding period last year. There were 13 cases of "Sick on leave" and 32 days spent in hospital by three patients "remaining" from last period—a total of 825 days non-effectiveness as compared with 605 days in the corresponding period of last year.

A silver tea tray was presented to the College by Air Vice-Marshal Cave-Brown-Cave on the expiration of his tour of duty as Commandant in December.

A silver replica of a practice bomb to be competed for at Armament Training Camp was presented by Sqn. Ldr. Gray on the expiration of his tour of duty as O.C. "B" Squadron in April

A coloured, signed artist's print of the Duke of Windsor who, as Prince of Wales, performed the opening ceremony of this new College building in 1934, has just been presented by Air Comdre. Breese, whose two sons are now Flight Cadets in the College.

Thirty-three Flight Cadets have finished their training at the Royal Air Force College this term, of whom 8 are being posted to Fighter Squadrons, 13 to Light Bomber Squadrons, 3 to General Reconnaissance Squadrons, 2 to Flying Boat Squadrons, 5 to Army Co-operation Squadrons, and 2 to Torpedo Bomber Squadrons.

Awards.—His Majesty the King's Medal (presented to the Flight Cadet who obtains the highest aggregate of marks in all subjects in the final order of merit following the passing-out examinations): Flt. Cadet Under-Officer James Maitland Nicholson Pike.

The Sword of Honour (presented to the best all-round Flight Cadet): Flt. Cadet Under-Officer James Maitland Nicholson Pike.

Air Ministry Prize (awarded to the Flight Cadet obtaining the highest marks in Imperial and War Studies): Flt. Cadet Peter Saumarez Butler.

Air Ministry Prize (awarded to the Flight Cadet obtaining the highest marks in Aeronautical Engineering): Flt. Cadet Under-Officer Robert Thomas Frogley.

Abdy Gerrard Fellowes Memorial Prize (for the Flight Cadet obtaining the highest marks in Mathematics and Science): Flt. Cadet Sergeant Philip Mervyn Wigg.

The J. A. Chance Memorial Prize (for the Flight Cadet obtaining the highest marks in Service Subjects): Flt. Cadet Sergeant Philip Mervyn Wigg.

The R. M. Groves Memorial Prize (for the best all-round pilot in the senior term): Flt. Cadet Sergeant P. A. N. Cox.

Flight Cadet Under-Officer J. M. N. Pike receives from Field Marshal Sir Cyril Deverell the Sword of Honour for the best all-round cadet.

ROYAL AIR FORCE GAZETTE

London Gazette, August 3, 1937
General Duties Branch

Acting Pilot Officers on probation confirmed in appointments and graded as Pilot Officers on dates stated: May 4, 1937.—G. A. Roden. May 11, 1937.—R. N. Belgrove, E. C. Cathels, R. T. Collier, E. H. Dally, D. J. H. Lay, H. P. Pleasance, P. P. Troughton-Smith, C. S. F. Wood. May 18, 1937.—H. D. Card, D. T. St. H. Dawes, R. B. Langlois, F. T. May, D. C. Stapleton, E. T. Williams. July 6, 1937.—J. J. Bennett, G. R. N. H. Jam, G. H. John, W. J. Macrae, D. D. Middleton, T. K. Milne, J. H. T. Pickering, J. E. Riepenhausen, J. S. Sherwood, H. E. Vickery. July 10, 1937.—R. B. Barker, S. E. A. Brown, J. M. Hewson, D. S. Pain, D. C. B. Riddick, C. A. Vernieux, J. M. Warren. July 11, 1937.—C. D. Lavers.

Acting Pilot Officers on probation graded as Pilot Officers on probation, July 13, 1937.—D. S. Forsyth, J. N. Culverwell. Flight Lieutenants promoted to rank of Squadron Leader, August 1, 1937.—R. J. Carvell, N. A. Pearce, J. E. M. MacCallum, P. W. M. Wright, J. H. Pool, C. McK. Grierson, B. H. Ashton, M. G. Philpott, W. G. Abrams, G. F. Simond, H. G. Wheeler, J. R. H. Pott, E. L. Mole, G. I. L. Saye, A.F.C., J. C. A. Johnson. F. R. Worthington, R. C. Field, R. K. Hamblin, A. R. Combe, R. W. K. Stevens, J. H. T. Simpson, T. M. Abraham, S. L. Blunt, K. S. Brake, W. K. Beisiegel, A. W. Hunt, C. S. Ellison, P. D. Cracroft, A.F.C., J. E. M. Bainbridge, F. J. Taylor, J. N. T. Stephenson, V. Q. Blackden. Flying Officer (acting Flt. Lt.) G. J. I. Clennell promoted to rank of Flight Lieutenant, July 9, 1937. Pilot Officers promoted to rank of Flying Officer on dates stated: June 14, 1937, J. N. Dowland; July 13, 1937, D. O. F. Lumsden.

Cdr. E. W. Anstice, R.N., Wing Commander, R.A.F., ceases to be attached to R.A.F. on return to Naval duty, June 8, 1937. Sqn. Ldr. R. Kellett ceases to be seconded for service with Imperial Japanese Army, May 22, 1937. Air Cdr. H. Le M. Brock, C.B., D.S.O., placed on retired list at own request, August 1, 1937. Wing Cdr. E. R. Pretyman, A.F.C., placed on retired list at own request, July 1, 1937. Flt. Lt. M. Hare transferred to Reserve, Class C, August 1, 1937. Lt. V. C. Grenfell, R.N., Flying Officer, R.A.F., relinquishes temporary commission on retirement from Royal Navy, August 4, 1937.

Wing Cdr. P. Warburton, M.B.E., is placed on the retired list at his own request (August 6).

Equipment Branch

Flight Lieutenants promoted to rank of Squadron Leader, August 1, 1937: F. D. D. Gaussen, H. J. Young, M.B.E., B. E. Essex, A. J. Redman, D.F.C., N. W. Law, J. Davison, R. M. Thomas.

Accountant Branch

Flt Lt. J. H. S. Richards promoted to rank of Squadron Leader, August 1, 1937.

Medical Branch

Flt. Lt. S. B. S. Smith, L.M.S.S.A., D.T.M. and H., promoted to rank of Squadron Leader, May 15, 1937.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers
General Duties Branch

G. H. Mansell granted commission as Pilot Officer in Class A, with effect from July 20, 1937, and with seniority of April 27, 1934. J. Edelsten granted commission as Flying Officer in Class C, with effect from July 20, 1937, and with seniority of March 31, 1930. Sqn. Ldr. C. B. Riddle (R.A.F. retired) granted commission as Flight Lieutenant (Hon. Sqn. Ldr.) in Class C, June 2, 1937. F/O. F. W. Marshall transferred from Class A to Class C, July 5, 1937. F/O. A. V. Harvey relinquishes commission on appointment to commission in Auxiliary Air Force, June 1, 1937.

AUXILIARY AIR FORCE

General Duties Branch

No. 502 (ULSTER) (BOMBER) SQUADRON.—W. H. McGiffin granted commission as Pilot Officer, July 1, 1937.

No. 504 (COUNTY OF NOTTINGHAM) (BOMBER) SQUADRON.—G. W. L. Darwin granted commission as Flying Officer, June 6, 1937.

No. 600 (CITY OF LONDON) (FIGHTER) SQUADRON.—P/O. C. J. Mount promoted to rank of Flying Officer, May 23, 1937.

No. 601 (COUNTY OF LONDON) (FIGHTER) SQUADRON.—P/O. G. H. Mansell relinquishes commission on appointment to commission in Reserve of Air Force Officers, July 20, 1937.

No. 605 (COUNTY OF WARWICK) (BOMBER) SQUADRON.—J. H. Warren granted commission as Pilot Officer, July 3, 1937.

No. 607 (COUNTY OF DURHAM) (FIGHTER) SQUADRON.—G. D. Craig granted commission as Pilot Officer, May 28, 1937.

No. 615 (COUNTY OF SURREY) (ARMY CO-OPERATION) SQUADRON.—A. V. Harvey granted commission as Squadron Leader and appointed to command of Squadron, June 1, 1937.

Accountant Branch

No. 502 (ULSTER) (BOMBER) SQUADRON.—W. M. May granted commission as Pilot Officer, July 10, 1937.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Group Captain.—W. D. Budgen, O.B.E., to R.A.F. Depot, Uxbridge; to command, 16.7.37.

Wing Commanders.—P. J. Barnett, M.C., to Headquarters, No. 23 (Training) Group, Grantham; for Armament duties, 17.7.37. A. H. Flower, to R.A.F. Station, Ramleh, Palestine; to command, 1.7.37.

Squadron Leaders.—H. L. Patch, to No. 6 Armament Training Camp, Woodsford; for Armament duties, 17.7.37. B. A. S. Lewin, to No. 75 (Bomber) Squadron, Driffield; for Flying duties, 13.7.37. W. R. Day, to No. 12 (Fighter) Group, Hucknall; for Signals duties, 19.7.37. C. J. W. Hatcher, A.F.C., to No. 1 Equipment Depot, Kidbrooke; for Armament duties, 19.7.37. V. F. Whatling, D.S.M., to No. 17 (Training) Group, Lee-on-the-Solent; for Signals duties, 5.7.37. C. B. Greet, to No. 1 School of Technical Training (Apprentices), Halton; for Administrative duties in No. 5 Apprentices Wing, 16.7.37. A. H. Harrison, D.S.M., to Home Aircraft Depot, Henlow; for Engineer duties in No. 2 Wing, 17.7.37. M. Lowe, to No. 2 Flying Training School, Digby; for Flying duties in Advanced Training Squadron, 19.7.37. H. R. Bardon, to Home Aircraft Depot, Henlow; for Engineer duties in the R.A.F. School of Aeronautical Engineering, 20.7.37. H. Little, to No. 5 Flying Training School, Sealand; for Engineer duties, 15.7.37. L. S. Snaith, A.F.C., to No. 83 (Bomber) Squadron, Turnhouse; to command, 19.7.37.

Flight Lieutenants.—P. J. Polglase, to No. 23 (Training) Group, Grantham, 1.6.37. M. Watson, to No. 5 (Bomber) Group, Mildenhall, 6.7.37. H. G. Richards, to No. 8 Flying Training School, Montrose, 12.7.37. T. F. U. Lang, to No. 502 (Ulster) (Bomber) Squadron, Aldergrove, 8.7.37. D. P. Lascelles, to Central Flying School, Upavon, 9.8.37. L. M. Hooper, to Air Armament School, Eastchurch, 17.7.37. A. H. Fear, to Aeroplane and Armament Experimental Establishment, Martlesham Heath, 17.7.37. D. I. P. Macnair, to Armament Training Camp, Leuchars, 17.7.37. N. H. Fresson, to Headquarters, No. 4 (Bomber) Group, Linton upon Ouse, 5.7.37. C. J. Giles, to Armament Training Camp, North Coates Fitties, 10.7.37. J. A. P. Harrison, to No. 78 (Bomber) Squadron, Dishforth, 7.7.37. A. C. Watson, to Home Aircraft Depot, Henlow, 14.7.37. G. L. S. Griffith-Jones, to Cambridge University Air Squadron, 7.7.37. R. W. K. Stevens, to Headquarters, R.A.F., Middle East, Cairo, 1.7.37. J. J. A. Sutton, to No. 33 (Bomber) Squadron, Ismailia, 3.7.37. C. C. Morton, to R.A.F. Station, Kalafrana, Malta, 17.7.37. K. F. Ferguson, to Cambridge University Air Squadron, 19.7.37. J. D. Rutherford, to Marine Aircraft Experimental Establishment, Felixstowe, 22.7.37. R. A. Whyte, to D. of T., Dept. of A.M.P., Air Ministry, 15.7.37. H. G. Blair, to R.A.F. Station, Duxford, 30.6.37. A. E. Cairnes, to Royal Air Force College, Cranwell, 12.7.37. H. I. Dabinett and G. H. Catheral, to No. 2 Flying Training School, Digby, 12.7.37. R. G. E. Catt and E. Foster, to No. 3 Flying Training School, Grantham, 12.7.37. R. V. Alexander and A. L. Christian, to No. 6 Flying Training School, Netheravon, 12.7.37. R. V. Bucknall, to No. 9 Flying Training School, Hullavington, 12.7.37. B. E. Lowe, to No. 10 Flying Training School, Tern Hill, 12.7.37. G. J. Spence, to No. 11 Flying Training School, Wittering, 12.7.37. W. J. Hickey, to R.A.F. Station, Hendon, 12.7.37.

Flying Officers.—P. W. Townsend, to No. 43 (Fighter) Squadron, Tangmere, 27.6.37. G. L. Cruickshanks, to R.A.F. Station, Heliopolis, 20.6.37. J. M. Southwell, to No. 1 Flying Training School, Leuchars, 12.7.37. C. F. C. Wright, to No. 2 Flying Training School, Digby, 12.7.37. P. O. Hilton, to No. 5 Flying Training School, Sealand, 12.7.37. A. P. Hollick, to No. 612 (Co. of Aberdeen) (A.C.) Squadron, 12.7.37. H. M. W. Thomas-Ferrand, to No. 614 (Co. of Glamorgan) (A.C.) Squadron, 12.7.37. F. M. Loudon, to No. 615 (Co. of Surrey) (A.C.) Squadron, 12.7.37. R. R. Gregory, to No. 605 (Co. of Warwick) (Bomber) Squadron, 12.7.37. P. H. Dunn, to No. 500 (Co. of Kent) (Bomber) Squadron, 12.7.37.

Pilot Officers.—C. R. D. Stewart, to Headquarters, No. 12 (Fighter) Group, Hucknall, 14.6.37. W. E. Legard, to No. 79 (Fighter) Squadron, Biggin Hill, 7.7.37. R. W. Gautrey, J. St. J. Thomson, and A. G. Wincott, to No. 201 (Flying Boat) Squadron, Calshot, 18.7.37. R. C. O. Lovelock and F. Phillips, to No. 204 (Flying Boat) Squadron, Mount Batten, 18.7.37. M. H. Cox, to No. 209 (Flying Boat) Squadron, Felixstowe, 18.7.37. P. H. Alington, to No. 228 (Flying Boat) Squadron, Pembroke Dock, 18.7.37. E. J. C. Michelmore and M. H. Romer, to No. 33 (Bomber) Squadron, Ismalia, 29.6.37. T. G. Robertson, to No. 1 Armament Training Camp, Catfoss, 14.7.37. O. L. Williams, to No. 37 (Bomber) Squadron, Feltwell, 15.7.37. W. E. Mulford, to No. 10 (Flying Training School, Ternhill, 12.7.37.

Acting Pilot Officers.—P. Folkes, to No. 43 (Fighter) Squadron, Tangmere, 3.7.37. A. C. Griffin, to No. 113 (Bomber) Squadron, Upper Heyford, 10.7.37. H. A. H. Watts, to No. 7 Flying Training School, Peterborough, 17.7.37. J. A. Slater, to No. 2 Flying Training School, Digby; on appointment to a short service commission, on probation, 21.6.37.

Commissioned Engineer Officers

Flying Officers.—H. Myles, A.F.M., to R.A.F. Depot, Aboukir, Egypt; on appointment to a permanent commission, on probation, 7.7.37. W. R. Frost, to R.A.F. Station, Abbotsinch; on appointment to a permanent commission, on probation, 7.7.37.

THE INDUSTRY

Lucas-C.A.V.-Bosch Development

IT is announced that an opportunity occurred for Joseph Lucas, Ltd., to purchase the shareholding in C.A.V.-Bosch, Ltd., of Acton, previously held by Robert Bosch, of Stuttgart, and they now entirely own C.A.V.-Bosch. The Agreements between Lucas, C.A.V.-Bosch and Robert Bosch remain exactly as hitherto, and the facilities for full interchange of patents, together with all engineering experience, will be continued.

Mole Drainage at Ansty

IT may be recalled that in *Flight's* description of the Civil Training School at Ansty (July 8, 1937) mention was made of the efficient drainage of the aerodrome. This was the work of T. Allsopp and Sons, of Fleckney, Leicester, acting as sub-contractors to the aerodrome constructors, J. B. Carr and Co., Ltd.

They carried out what is aptly known as mole drainage, using the cable system, which they claim to be the most efficient method and which they first employed in 1874. It is stated that there are many instances of their drains, made more than sixty years ago, still working.

Transportable Hangars

WHAT might be described as a utility hangar is constructed by Head, Wrightson Co., Ltd., of Thornaby-on-Tees. Approved by the Air Ministry after adequate demonstration of their efficiency, these Bellman hangars, as they are called, are now in wide use. Being very simply erected from standard lightweight parts, they are easily transportable, and they need no foundations. Canvas or galvanised iron can be used as a covering for walls and doors according to whether the hangars are erected for short periods or more permanently. The size can be varied and may be as large as 90 ft. in span by 25 ft. in height and up to any length. Storage sheds, workshops, etc., are also prepared, and are similar in character.

A Compact Tool

The smallest of some 40 types of portable hammer made by Broom and Wade, Ltd., of High Wycombe, the P.B. 120 model weighs only 2¼ lb. and is but 8ins. in length. It is stated that the hammer, which is the subject of a large repeat order from the Air Ministry, will close up to 5/32in. Dural or 3/32in. steel rivets on 75-95 lb. air pressure, giving 4,000 blows per minute.

Keeping It Quiet

IT is well known that any reasonable expense incurred in eliminating aircraft vibration may be regarded as profitable in the long run. A company, Metalastik, Ltd., has been formed to develop and produce mountings of special bonded to rubber to reduce vibration and noise. This new company is closely associated with the John Bull Rubber Company, Ltd., the offices being at the same address, namely, Evington Valley Mills, Leicester.

The chief advantage claimed for this rubber-to-metal bonding system is that the rubber is free to move within the full safe limits of its own inherent elasticity. The company has developed its own aero engine suspension system using special light metals and providing a highly resilient mounting for a minimum weight. Mountings have also been designed to carry even the most delicate aircraft instruments and render them immune from the effects of vibration.

The specialised knowledge of Metalastik, Ltd., is at the disposal of anyone with machinery vibration or noise problems.

INCREASES OF CAPITAL

BOULTON AND PAUL, LTD. (Riverside Works, Norwich).—The nominal capital has been increased by the addition of £500,000 beyond the registered capital of £250,000. The additional capital is divided into 325,000 shares of £1 each and 700,000 shares of 5s. each.

PUBLICATIONS RECEIVED

Official History of Australia in the War of 1914–1918: Vol. V, The A.I.F. in France, December 1917-May 1918, by C. E. W. Bean. Angus and Robertson, Ltd., 89 Castlereagh Street, Sydney, Australia.

Southampton Municipal Airport: Its Services and Facilities. Airport Managers, Southampton Airport, Southampton.

"Howlers" from Henlow, by D. van Berckelaer, price 1s. H. W. Robinson and Son, Bedford.

Foreign Air Regulations Handbook, No. 14: Holland, price 6d. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Aeronautical Research Committee Report for the Years 1935 and 1936, price 4s. H.M. Stationery Office, Adastral House, Kingsway, London, W.C.2.

Lilienthal-Gesellschaft für Luftfahrtforschung. Jahrbuch 1936. 20RM. R. Oldenbourg, Schliessfach 31, München 1, Germany.

Sandvik Steel.—Sandvik Steel Works Co., Ltd., Sweden.

Clouds of Glory, by John Moore. Price 7s. 6d. J. M. Dent and Sons, Ltd., Aldine House, Bedford Street, London, W.C.2.

Wings Over the Atlantic, by A. D. Divine. Price 3s. 6d. John Lane, The Bodley Head, Ltd., Bury Street, London, W.C.

The Aircraft Year Book for 1937. Price $6.00. Aeronautical Chamber of Commerce, of America, Inc., 30, Rockefeller Plaza, New York, U.S.A.

Catalogue: *Hepolite Products*, Hepworth and Grandage, Ltd., St. John's Works, Bradford.

National Advisory Committee for Aeronautics: Report No. 575: Interference of Wing and Fuselage from Tests of 28 Combinations in the N.A.C.A. Variable-Density Tunnel by A. Sherman, 10 cents. No. 577: Pre-chamber Compression-Ignition Engine Performance, by C. S. Moore and J. H. Collins, Jr., 10 cents. No. 581: Measurements of Intensity and Scale of Wind-Tunnel Turbulence and Their Relation to the Critical Reynolds Number of Spheres, by H. L. Dryden, G. B. Schubauer, W. C. Mock Jr. and H. K. Skramstad, 15 cents. No. 582: A Theory for Primary Failure of Straight Centrally Loaded Columns, by E. E. Lundquist and C. M. Figg, 15 cents. No. 584: Strength of Welded Aircraft Joints, by W. C. Brueggeman, 15 cents. All from Superintendent of Documents, Washington, D.C., U.S.A.

International Index to Aeronautical Technical Reports 1936. 5s. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway London, W.C.2.

Panel Beating and Sheet Metal work, by Sidney Pinder, 4s. Sir Isaac Pitman and Sons Ltd., Parker Street, Kingsway, London W.C.2.

A Guide to the Library of Commerce, edited by the City Librarian. Central Public Library, College Green, Bristol.

Foreign Air Regulations Handbook No. 8.: Denmark, price 3d. Air Ministry, Adastral House, Kingsway, London, W.C.2.

Aeroplanes and Aero Engines, by Capt. P. H. Sumner, 15s. Technical Press Ltd., 5, Ave Maria Lane, Ludgate Hill, London, E.C.4.

The Royal Air Force Quarterly. July 1937, 5s. Gale and Polden, Wellington Works, Aldershot.

Petrol-engined Model Aeroplanes, by C. E. Bowden, 3s. 6d. Percival Marshall and Co. Ltd., 13-16, Fisher Street, London, W.C.1.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged etc.)

(Published July 15, 1937.)

31961. HEINKEL, E.: Manual elevation control mechanism for aircraft (467,969).
34736. GARDEN, A. D.: Aircraft (467,670).
35515. BENDIX, LTD., and IRVING, J. S.: Vehicle brakes (467,826).
35539. JOSSELYN, J., and BLAKE, R.: (Legal representatives of LA CIERVA, J. (decd.)): Aircraft having freely rotative wings (467,980).
35558. ROWLEDGE, A. J.: Sealing-rings for sleeve valves or pistons of internal combustion engines (467,982).
13069. PINTSCH AKT.-GES., J.: Landing headlamps for aircraft (467,698).
14196. BRISTOL'S INSTRUMENT CO., LTD.: Motor-driven apparatus for the timed control of a cycle of operations (467,765).
21122. KRAFFT, E., and WEICHARDT, R. (trading as KRAFFT & WEICHARDT): Apparatus for manipulating aircraft landing flaps (467,775).
28989. MASTROSANTI, E.: Parachutes (467,884).
31294. JUNKERS FLUGZEUG-UND-MOTORENWERKE AKT.-GES.: Apparatus for producing oscillations for testing structures and structural parts (467,796).

NEW COMPANIES

In the notes below, for reasons of space, the "objects" of new companies are usually somewhat abbreviated.

WESTERN ISLES AIRWAYS, LTD., was registered as a private company on July 19 in Edinburgh, with a nominal capital of £100 in 100 shares of £1. The objects are to establish, maintain and operate lines of aerial conveyances, etc. The subscribers are George Nicholson (managing director of Northern and Scottish Airways Ltd.) and C. Fraser. The first directors are not named.

OLDHAM AIRCRAFT CONSTRUCTION CO. LTD. Private company, registered July 27. Capital, £2,000 in 2,000 shares of £1 each. Objects: To acquire the business of designers and constructors of a two-seater monoplane carried on by Robert Woolley, Savill Dawson and Alfred Payne at Oldham. The directors are Robert Woolley, Savill Dawson, Fred Knott, and Frank H. Robinson. Registered Office: Victoria Saw Mills, Smith Street, Oldham.

I.V.P. AIRSCREWS, LTD. Private company, registered July 21. Capital, £100 in 2,000 shares of 1s. Objects: To acquire any patents or inventions in connection with power transmission mechanisms and change-speed mechanisms, and to carry on the business of manufacturers and repairers of and dealers in power transmission and change-speed mechanisms, etc. Registered office: 1, London Wall Buildings, London, E.C.2.

PADDY FLYNN FLYING CLUB LTD. Private company, registered July 9. Capital, £1,000 in 1,000 shares of £1. Objects: To carry on the business of constructors in aviation, aerial navigation, aerial and ground signalling, dealers in and importers and exporters of aircraft and aircraft engines, etc. The directors are John J. Flynn, air pilot, Merrock S. C. Hyams, air pilot, Muriel Montgomery. Solicitors: Richard Brooks and Son, 11–12, Finsbury Square, London, E.C.2.

LAMINA LTD. Private company, registered July 19. Capital, £20,000 in 20,000 shares of £1 each. Objects: To carry on the business of manufacturers of and dealers in laminated, bent and manipulated timber and other materials of all kinds; parts for motor cars, aeroplanes, boats and vehicles of every description. The subscribers are Daniel L. Alesbury and Frederick Cummings. D. L. Alesbury is permanent governing director. Registered office: Clay Lane, Coventry.